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LITTLE SMOKY VALLEY ENVIRONMENTAL

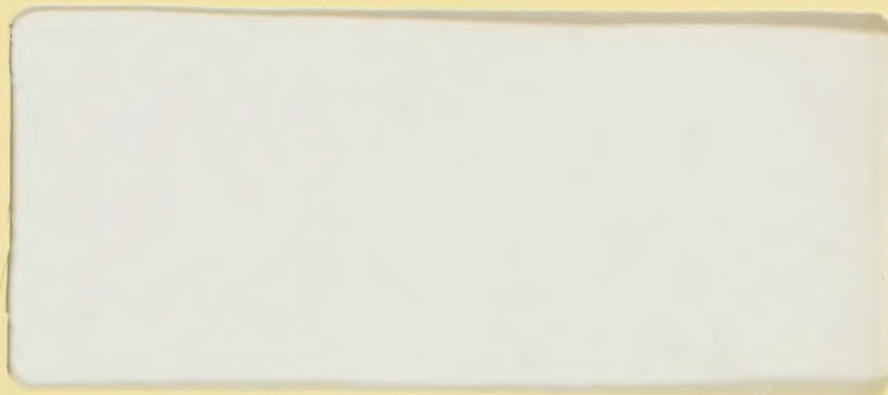
ASSESSMENT RECORD - FINAL

NV-040-7-18

(N-7340)

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LITTLE SMOKY VALLEY ENVIRONMENTAL

ASSESSMENT RECORD - FINAL

NV-040-7-18

(N-7340)

FOR

OIL AND GAS LEASING

ELY DISTRICT

EGAN RESOURCE AREA

DUCKWATER PLANNING UNIT

OF THE

CURRENT PLANNING AREA

WHITE PINE AND NYE COUNTIES

NEVADA

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Prepared by:

Eugene Jonart - Environmental Coordinator

Norman Melvin - Nevada State Office Geologist

Memorandum

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

IN REPLY REFER TO:

1791/N-7340
3100
(N-911)

To : Chief, Division of Technical Services

Date: JUN 7 1977

FROM : Chief, Planning and Environmental Coordination Staff

SUBJECT: Oil and Gas Leasing in the Little Smoky Valley Area

The Planning and Environmental Coordination Staff and the Division of Resources have reviewed the subject proposal, including the EAR as submitted by the Ely District staff. Based on this review and after coordination with the District in revising certain aspects of the EAR, the following comments and recommendations are made:

1. The EAR as written and revised appears to meet Bureau and NEPA requirements.
2. Notification of the proposed action has been coordinated through the State Clearinghouse as required by OMB Circular A-95.
3. The District Manager's recommendations are contained in a memorandum dated May 24, 1977 (Enclosure 1). This document contains the District's recommendations for:
 - a. Stipulations to be included in all leases issued.
 - b. Special stipulations to be included for site-specific leases.
 - c. Areas to be excluded from leasing.
4. We concur with the District's specific recommendations for the above items as contained in the May 24, 1977 memorandum (Attachment's A, B and C).
5. It is our conclusion that an environmental impact statement is not needed for the proposed action. Because of the recommended stipulations and the areas which are to be excluded from leasing or from surface occupancy we feel that adequate protection is provided for the resource values of the area. We further feel that there have been no values identified which would be so impacted as to preclude the issuance of leases even if a full commercial development were to result.
6. It is our recommendation that oil and gas leasing be permitted in the area in question within the constraints listed above including the stipulations and the exclusion areas.

Start to finish

I concur:

Hugh Harper

Chief, Division of Resources

I approve:

Logan R. Smith

State Director, Nevada

1 Enclosure

Encl. 1 - District Memo of 5/24/77

cc: (W/O encl.)

DM, Ely

UNITED STATES GOVERNMENT

Memorandum

1791/N-7340
(N-041)

TO : State Director (N-911)

DATE: May 24, 1977

FROM : District Manager-Ely (N-040)

SUBJECT: Decision Document for Little Smoky Valley
Oil and Gas Lease Area

I have reviewed the environmental assessment for the subject area and based upon the information contained therein, I find that the energy leasing program in the subject area will not significantly affect the human environment and therefore recommend that no impact statement be prepared pursuant to Section 102 of PL 91-190.

Based on recommendations found within the environmental assessment for the subject area, I recommend that Alternative I (i.e., issuance of energy leases with the addition of special stipulations to protect specified resource values) is the most desirable alternative for an energy leasing program in this area.

I recommend the following:

(1) that the general stipulations in Attachment A be included in all energy leases, and

(2) that special stipulations as discussed in Attachment B be added to any leases affecting the described areas.

Finally, based on factors brought out in the EAR as well as recent program directives I have decided to exclude from all leasing and surface occupancy the areas described in Attachment C, pending further environmental and wilderness studies.

This document has been reviewed by the State Clearinghouse and has been modified to reflect comments received from participating agencies. Because of PAWP commitments, etc., we request that NSO provide all the necessary copies of this final EAR to participating agencies, etc. We request that NSO also provide us with 3 copies for District use.

Enclosures:

Case File for N-7340
Final EAR and Technical Report of N-7340



ATTACHMENT A

General stipulations to be added to all Oil and Gas Leases

The Lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee, the Supervisor and the Authorized Officer:

1. No drilling or storage facilities will be allowed within 500 feet of any pond, spring or stream. Other buffer zones and areas near water may be restricted to protect riparian habitat. This distance may be modified when specifically approved in writing by the district engineer, Geological Survey with the concurrence of the Ely District Manager, B.L.M.
2. To secure specific compliance with the stipulations under Sec. 2, paragraph (q) of the oil and gas lease form, the lessee shall, prior to operations, furnish to the Authorized Officer a certified statement that either no archaeological values exist or that they may exist on the leased lands to the best of the lessee's knowledge and belief and that they might be impaired by oil and gas operations. Such certified statement must be completed by a qualified archaeologist acceptable to the Authorized Officer.

If the lessee furnishes a statement that archaeological values may exist where the land is to be disturbed or occupied, the lessee will engage a qualified archaeologist, acceptable to the Authorized Officer, to survey and salvage, in advance of any operations, such archaeological values on the lands involved. The responsibility for the cost for the certificate, survey and salvage will be borne by the lessee, and such salvaged property shall remain the property of the lessor or the surface owner.

3. The use of wide or balloon-tired vehicles and/or helicopters may be required for any activities in off-road areas where deemed necessary to protect the soil and other resources.
4. Springs and water developments on Federal lands may be used only with the prior written approval of the authorized officer.
5. Lessees and operators are to be informed of the laws concerning harassment of wildlife and wild horses.
6. To maintain esthetic values, all semi-permanent and permanent facilities will be painted or camouflaged to blend

with the natural surroundings. The paint selection or method of camouflage will be subject to approval by the District Engineer, Geological Survey, with the concurrence of the District Manager, Bureau of Land Management.

7. In order to minimize watershed damage during muddy and/or wet periods, the District Manager, Bureau of Land Management, through the District Engineer, Geological Survey, may prohibit exploration, drilling, or other development. This limitation does not apply to maintenance and operation of producing wells.

ATTACHMENT B

This attachment contains areas where important environmental values have been identified, therefore prior to entry into the public lands within the following described areas, the lessee (operator) will discuss the proposed activities jointly with the Area Oil and Gas or Area Supervisor and the Ely District Manager who may require additional measures for the protection of the stated concern. Such measures may include:

1. No surface occupancy on selected areas.
2. Restriction of activity during certain periods of the year.
3. Special reclamation techniques.
4. Restrictions on the type of equipment which can be used.

Areas of Specific Concern

1. In order to minimize surface disturbance to protect important seasonal wildlife habitat exploration, drilling, and other development activity will be allowed during a selected period for areas identified below.

This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by the District Engineer, Geological Survey, with the concurrence of the District Manager, Bureau of Land Management.

Crucial Winter Habitat

Chukar Partridge Activity allowed from April to November 30.

T. 10 N. R. 54 E.	Secs. 23, 24, 26	all unsurveyed
T. 11 N. R. 54 E.	Sec. 13	all unsurveyed
	Secs 12 S $\frac{1}{2}$; 24 N $\frac{1}{4}$	all unsurveyed
T. 11 N. R. 55 E.	Secs. 7, 8, 17 to 19,	all unsurveyed
T. 12 N. R. 54 E.	Sec. 25	all unsurveyed
	Secs. 24 S $\frac{1}{2}$; 36 E $\frac{1}{2}$	all unsurveyed
T. 12 N. R. 55 E.	Secs. 19, 29, 30, 31, 32	all unsurveyed
T. 15 N. R. 54 E.	Secs. 1, 2, 12	all unsurveyed

Sage Grouse Activity allowed from July 1 to February 1.

T. 14 N. R. 52 E.	Secs. 8, 9, 10, 15, 17, 20, 21, 22, 23, 24, 26, 35, 36	all
T. 14 N. R. 53 E.	Secs. 19, 30, 31	all

Mule Deer Winter Range Activity allowed from April 1 to Nov. 30

T. 12 N. R. 54 E.	Secs. 2, 3, 4	N $\frac{1}{2}$	
T. 13 N. R. 54 E.	Secs. 4, 9, 16 to 21, 28, 29, 34, 35, 36		all
T. 13 $\frac{1}{2}$ N. R. 53 E.	Secs. 23, 24		
	Secs. 25, 26, 35, 36		all
T. 13 $\frac{1}{2}$ N. R. 54 E.	Secs 19, 20, 21		
	Secs. 28 to 32		all
T. 14 N. R. 53 E.	Secs. 1, 2, 3, 9 to 16, 21 to 25, 27, 28,		
	34, 35, 36		all
T. 14 N. R. 54 E.	Secs. 3 to 7, 18, 19, 30, 31		all

2. No occupancy or other activity on the surface of the below described lands is allowed under this lease. The lessee, however, may exploit the oil and gas resources in this area by directional drilling from sites outside the restricted area described below.

T. 15 N. R. 54 E.	Sec. 11		all
T. 14 N. R. 52 E.	Sec. 16, 19, 25		all
T. 14 N. R. 53 E.	Sec. 26		all
T. 13 $\frac{1}{2}$ N. R. 54 E.	Sec. 33		all
T. 12 N. R. 53 E.	Sec. 7		all
T. 12 N. R. 55 E.	Sec. 29		all
T. 11 N. R. 55 E.	Sec. 20		all
T. 10 N. R. 54 E.	Sec. 25		all

ATTACHMENT C
(Map -)

The following described areas have sufficient resource values to be excluded from energy leasing pending further studies:

Park Range

(unsurveyed) T. 12 N. R. 52 E.

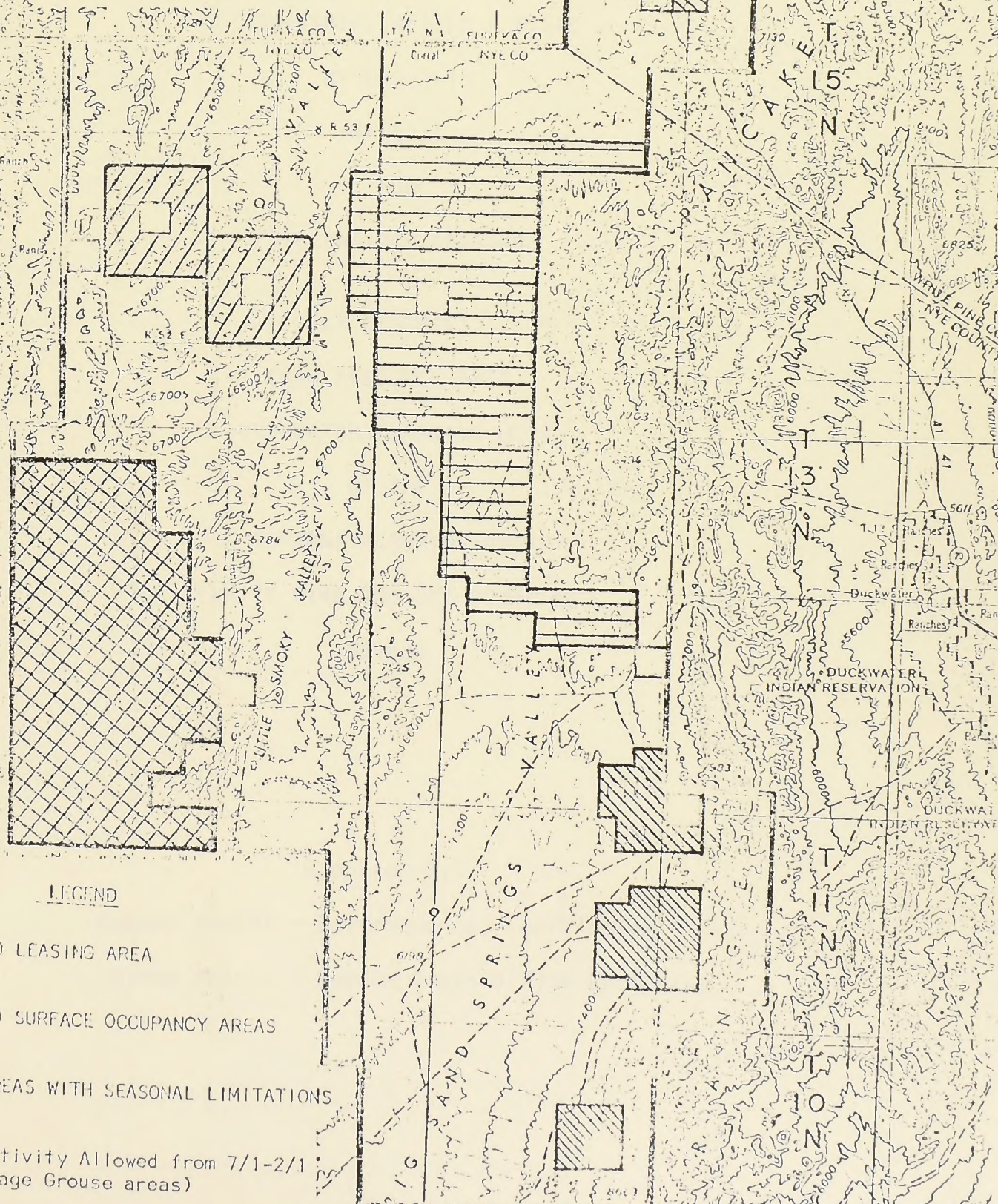
Sections 1 to 23, 27, to 36 all

(unsurveyed) T. 13 N. R. 52 E.

Sections 7, 8, 9, 10, 15 to 23, 26 to 35 all

Total Acreage = (est.) 35,840

LITTLE SMOKEY VALLEY AREAS OF ENVIRONMENTAL CONCERN



LEGEND

-  NO LEASING AREA
-  NO SURFACE OCCUPANCY AREAS
- AREAS WITH SEASONAL LIMITATIONS
-  Activity Allowed from 7/1-2/1 (Sage Grouse areas)
-  Activity Allowed from 4/1-12/1 (Chukar partridge areas)
-  Activity Allowed from 4/1-12/1 (Deer winter Areas)

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Prepared by:

Eugene Jonart - Environmental Coordinator

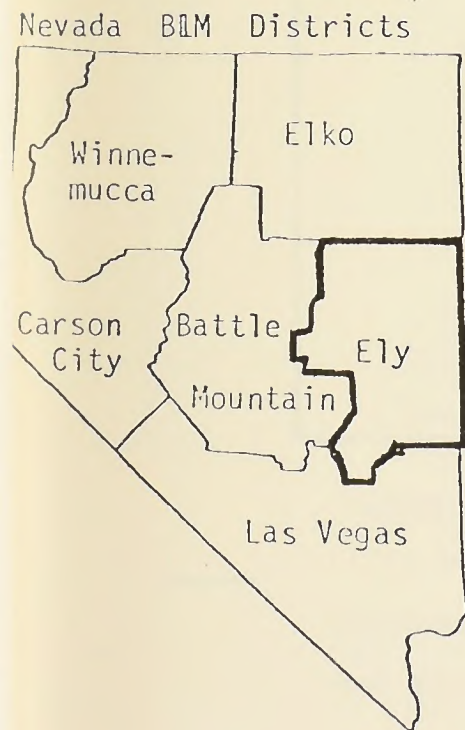
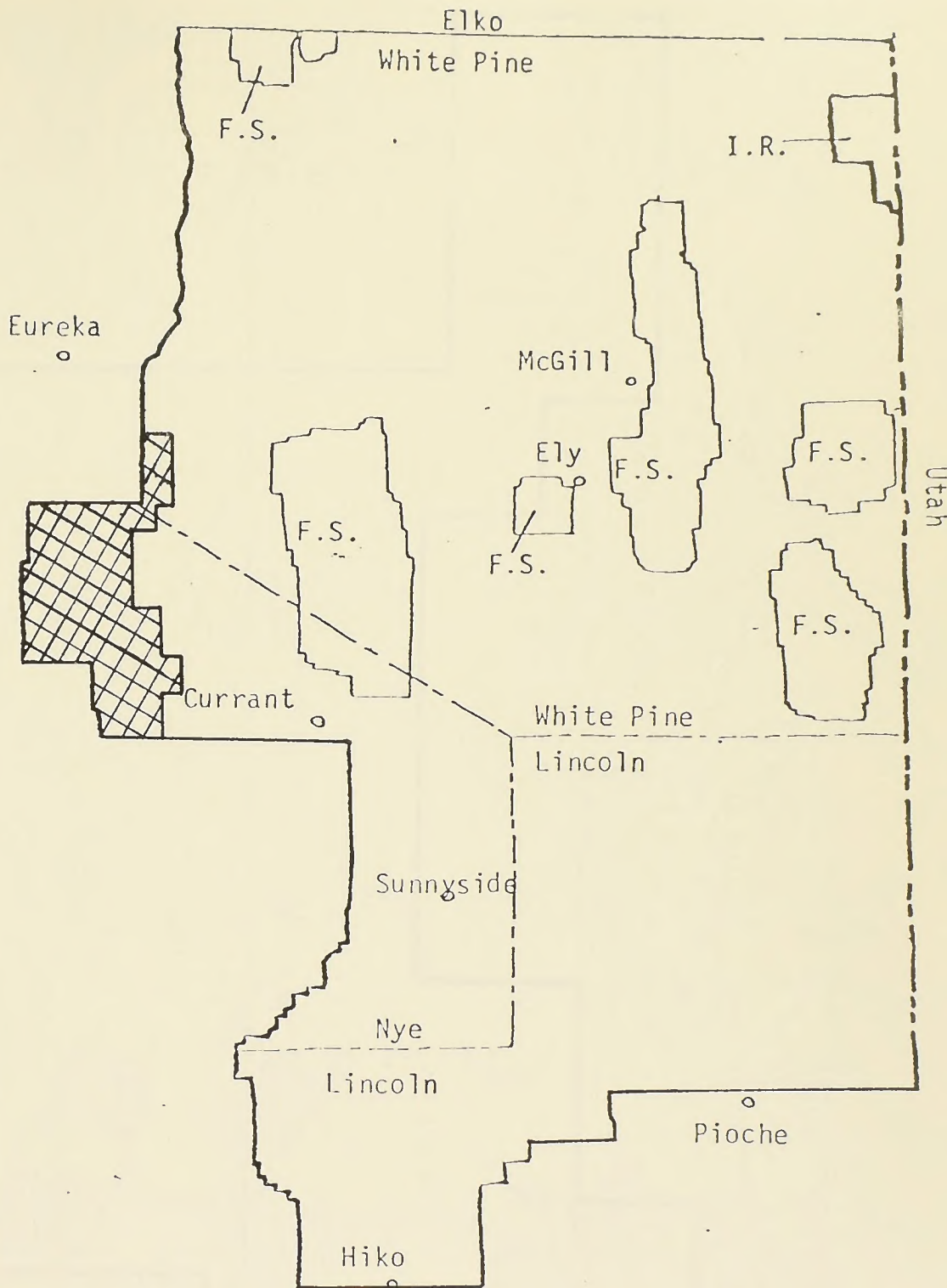
Norman Melvin - Nevada State Office Geologist

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ELY DISTRICT

MAP 1-1

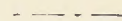


LEGEND

District Boundary



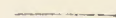
County Boundary



Area covered by this Assessment



National Forest



CHAPTER 1 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Action Already Taken

An Oil and Gas EAR was previously written for this area (1973) by the Battle Mountain District. Recently, there has been some interest shown for exploring for energy resources within this area.

This EAR will update portions of the 1973 version within the Ely District. The remainder of the area, to the west which was originally covered by the Hot Creek Little Smoky Valley EAR, is now covered by the Battle Mountain BLM District Oil and Gas EAR. Geothermal leasing is covered within the Eureka Geothermal EAR (N-10400), which can be reviewed in either the Ely or Battle Mountain BLM Districts. Currently, there are lease applications for this area which are awaiting this assessment.

Proposed Action

The proposed action involves the issuance of leases for oil and gas resources on about 316,000 acres of national resource lands administered by the BLM located in the southwestern portion of White Pine County and the north-eastern portion of Nye County (See Map 1-1). The study area encompasses parts of Little Smoky and Big Sand Springs Valleys as well as most of the Park Mountain Range. Leases would be subject to U.S. Department of Interior regulations, requirements, and terms contained in the following forms, etc.:

1. Regulations for Oil and Gas Leasing CFR 43, parts 3000 and 3100
2. Non-competitive Public Domain Lease (form 3120-3)
3. Notice of Intent to Conduct Oil and Gas Exploration Operations (form 3040-1)
4. Surface Disturbance Stipulations (form 3109-5)

Prior to any exploration drilling operations, the area to be investigated must be inspected by a cultural resources specialist to determine cultural resource value which may be disturbed by surface operations. Under Procedures of Secretarial Order #2948, drill sites are also inspected by USGS and BLM personnel.

Legal Authority for the Proposed Action

The oil and gas leasing program will be conducted under the authority of the Mineral Leasing Act of 2/25/20, as amended, and regulations of 43 CFR 3100. The proposed action involves:

1. The submission of "Notices of Intent to Conduct Oil and Gas Exploration Operations" (Form 3040-1) on areas not connected with a lease.
2. The issuance of non-competitive oil and gas leases (Form 3120-3).
3. The issuance of oil and gas leases by simultaneous lease offer and competitive bidding.

Alternatives to the Proposed Action

Two alternatives to the proposed action have been identified:

Alternative I - Issue oil and gas leases within the area with the addition of special stipulations where needed to protect specific resource values. Such stipulations may include:

1. no surface occupancy
2. seasonal surface occupancy

Alternative II - Issue no oil or gas leases within the study area and deny any existing applications.

Stages of Implementation

Both the proposed action and Alternative I could result in the following stages of implementation with each stage contingent upon successful completion of the preceding stages:

Discrete Operations

- | | |
|----------------|---|
| 1. Exploration | <ul style="list-style-type: none">- airborne exploration- off-road vehicular travel- road and trail construction- drilling- rehabilitation |
| 2. Development | <ul style="list-style-type: none">- road development- drill site development- processing tank installation- pipeline construction- rehabilitation |
| 3. Production | <ul style="list-style-type: none">- extraction of oil and/or gas- transportation of oil and gas- waste disposal- maintenance |
| 4. Abandonment | <ul style="list-style-type: none">- removal of equipment- restoration of surface |

These stages are described in detail in the Technical Report, which accompanies this analysis. Alternative II would preclude any oil and gas leasing within the study area.

CHAPTER 11 EXISTING ENVIRONMENT

A. Physical Factors

1. Climate

A semi-arid climate is characteristic of the lease area. Sunny skies prevail most of the year; the average percentage of sunshine being approximately 75 percent. Temperatures are moderate and precipitation relatively low. Local weather patterns vary considerably throughout the lease area as a result of elevational, topographic, and orographic influences. Table 2-1 is a summary of the climatological data for stations in or near this area.

The wettest months are April, May, and June, and the driest month is August. Snow usually occurs from late October, and usually ends in March or April, and contributes heavily to spring runoff. Thunderstorms provide most of the precipitation during the summer. Precipitation amounts vary greatly throughout the lease area, but the average precipitation is 6 inches in the valley floors, and generally increases up to 16 inches at the higher elevations.

Temperatures range from moderate to severe, varying from -21° F. to 93° F. The average temperature during the summer is 60° F., and the average temperature during the winter is 34° F. The hottest month is July and the coldest is December. The growing season is short, averaging somewhere between 100 and 150 days (see Table 2-1).

Prevailing winds are generally from the south due to weather patterns and north-south trending mountain ranges. South winds associated with frontal systems will occasionally gust up to 60 m.p.h. Convective winds are common, picking up dust and carrying large amounts of soil over long distances (dust devils). There are relatively few wind-free days in the lease area.

For a more detailed analysis of climate and weather, refer to the Duckwater Unit Resource Analysis, Step 2 - Physical Profile.

2. Soils

The soils within the Little Smoky Valley area fall into four broad generalized classifications according to their mode of occurrences (Great Basin Region Comprehensive Framework Study, Appendix VI, 1971, pp. 15-17).

CLIMATOLOGICAL DATA

	Fish Creek Ranch	Duckwater	Current Hwy. Station	Snowball	Bull Creek Ranch
<u>Elevation</u>	6050 ft.	5400 ft.	6100 ft.	7160 ft.	5900 ft.
Record Years	1944-1966	1966-Present	1962-Present	1965-Present	1963-1965
<u>Precipitation</u>					
Years of Record	22	5	8	5	3
Mean Annual	5.88	7.49	8.30	10.34	8.69
Mean April - Sept.	3.22	4.57	4.51	6.93	5.56
April - Sept. % of total	55	61	54	67	64
Mean Maximum	.62 (May)	1.59 (June)	1.51 (April)	1.66 (June)	1.50 (April)
Mean Minimum	.30 (Feb.)	.03 (Nov.)	.42 (Jan.)	.20 (Oct.)	.31 (Feb.)
<u>Temperature</u>					
Years of Record	22	5	8	5	3
Mean Annual Degrees F	42.2	49.4	44.0	43.8	45.7
Mean Coldest Degrees F	20.1 (Jan.)	29.3 (Dec.)	25.6 (Jan.)	25.9 (Dec.)	25.9 (Jan.)
Mean Warmest Degrees F	64.1 (July)	72.3 (July)	67.9 (July)	64.7 (July)	66.8 (July)
Extreme High Degrees F	99.0 (July)	98.0 (July)	92.0 (June)	87.0 (July)	-
Extreme Low Degrees F	-34.0 (Jan.)	-	-22.0 (Dec.)	-12.0 (Dec.)	-
Average Last Killing Frost in Spring	June 10	May 15	May 22	June 30	
Average First Killing Frost in Fall	Aug. 29	Sept. 21	Aug. 21	Aug. 22	-
Average Growing Season (Days)	80	125	91	53	

*Source of Information: U. S. Department of Commerce, Weather Bureau Records

Group A

The soils of the nearly level valley bottoms of the Basin and Range Physiographic Province mostly are in the arid and semi-arid climates. Many of these soils are affected by salinity, alkali, and high water tables. Some are near salty lakes and others are on flat exposed lake bottoms. The soil textures are typically silty clay loam, clay loam, and clay. Permeability is slow or very slow. Cemented hardpans in the subsoils occur in many places. Most of these soils are light colored. Where salinity and alkalinity are not serious problems, these soils can be cultivated and irrigated.

Group B (Alluvial Fan and Lake Terrace Soils)

Soils between the nearly level valley bottoms and the steep mountain slopes in the Basin and Range Physiographic Province constitute most of the cultivated land and potentially cultivatable land. These soils mainly are on alluvial fans and lake terraces and are light to moderately dark colored. A distinct accumulation of lime commonly occurs at 1 to 2 feet below the surface. Soil texture and permeability vary considerably. On the lower areas, and more gentle slopes near the valley bottoms, soil textures are typically clay loams that are free of gravel and cobble. The permeability is slow. Textures become coarser and gravel and cobble contents increase as slope gradients and elevations increase. On the steeper slopes near the mountains and lake terraces near the canyon mouths, the soils have loam and sandy loam textures, many of which are gravelly, cobbly, and stony. The permeability of these soils is moderate to rapid.

Group C (Upland Valley Soils)

The upland valley soils are fairly uniform in some characteristics and extremely variable in others. These soils are typically deep, dark colored, and free of salinity and alkali. Textures, permeabilities, lime accumulation, coarse fragments, and depth to water tables are highly variable. Gravelly and cobbly sandy loam soils are common along the major streams. Many of these have high water tables. Adjacent to these gravelly soils that have rapid permeability, are nongravelly soils with textures ranging from loam to clay. These soils have permeabilities ranging from moderately rapid to very slow. On alluvial fans and stream terraces adjacent to the mountains, some soils have loam surface textures, clay subsoils, and none to strong lime accumulations. Adjacent soils may be very cobbly loam or nearly any other texture to several feet. These soils are typically well drained.

Group D (Mountain Slopes)

The soils of the mountain slopes are mostly loam and sandy loam, have rapid to moderate permeability, and are deep to shallow. The deep soils are mostly in the swales. Some of the soils are shallow with 6 to 20 inches of soil over bedrock mostly near the ridges. About half of these soils have from 35 to 60 percent gravel, cobble, and stone below the surface. They are mostly free of lime although some have accumulations of lime in the substratum at 2 to 4 feet below the surface. The soils are dark to moderately dark colored.

3. Geology

The Little Smoky Valley within the study area is classified physiographically as within the Basin and Range Province. This province is characterized by more or less north-south trending mountains and intervening valleys. The study area itself is mainly flat to gently sloping bajadas and moderate-relief mountains. Elevations range from about 6,200 feet at the southern end to a high point of 9,240 feet in the Pancake Range on the east side. A smaller group of mountains (Park Range) is present on the western side of the valley.

Drainage in the valley is separated into a northward-draining portion and a southward-draining component. The northern drainage is into Fish Creek Valley and the southern drainage is into the Lunar Crater area via Sand Springs Wash.

The structural and tectonic history of the study area is quite complex as shown by the intricate lithologic pattern exposed in the mountains. Faulting in the area is predominantly of the high angle normal variety with some minor local thrust faulting present in the northern Moody Mountains.

Mineral Deposits

The subject area contains no known mineral deposits, nor have any energy minerals such as coal, oil, gas, or geothermal energy been located.

There are no Known Geologic Structures (KGS) or Known Geothermal Resource Areas (KGRA) located in the study area. The U.S. Geological Survey does, however, classify the area as potentially valuable for oil and gas resources on the basis of Mesozoic carbonate rocks underlying the valley. The recent discovery of oil at a second location in Railroad Valley, some 30 miles south-east of the area, has led to an increase in filings for oil and gas lease applications.

In spite of the widespread quaternary igneous activity, the area is not considered valuable for geothermal resources nor are there any warm or hot springs in the valley.

Geologic and Seismic Hazards

The geologic hazards may be due either to natural or man-made causes. Such hazards include seismic events, soil slump and creep, rock slides, subsidence, volcanic and flash flooding events.

Seismic activity decreases from west to east and the study area lies approximately on the boundary between the two areas. Earthquakes can be expected to occur in the area, but are likely to be of a lower magnitude (4.0 to 4.9 on the Richter Scale) than events farther west.

There is no specific data on subsidence in the valley although such a condition is a normal result of the horst-and-graben structure of the Basin and Range physiographic province.

Man-made changes such as extraction of fluids from the subsurface have caused localized subsidence. Removal of the liquids reduces the loadbearing capacity of the subsurface formations which results in a gradual settling of the surface. Extraction of rock materials in subsurface mining, on the other hand, results in a caving effect such as occurs in Karst topography.

These hazards may be natural or as a result of man-made changes. Such hazards are influenced by topography, geologic structure, nature of the surface and subsurface materials, vegetation, and climate. The potential of slide hazards is quite real unless proper engineering planning takes place prior to any land surface disturbing activity.

Miscellaneous Hazards

Hazards listed under this category include flash floods and volcanic activity. Flash flooding and erosion is a common occurrence in a desert environment. Normally dry streams can become, often in a matter of minutes, a raging, debris-laden torrent of muddy water. The mute evidence of the power of such floods can be seen by the numerous large cobbles, coarse gravels, boulders, and plant debris deposited at the mouths of mountain canyons.

Volcanic hazards are probably not very significant within the study area even though late quaternary igneous material is present in the adjacent mountains. The lack of geothermal activity indicates no cooling igneous mass is present close to the land surface.

4. Water

A large percentage of the precipitation which falls on Nevada is returned to the atmosphere through evapotranspiration. The distribution of this precipitation is as follows:

- | | |
|---------------------------------|----------------------|
| a. Precipitation, annual | 54,000,000 acre-feet |
| b. Runoff, annual | 3,200,000 acre-feet |
| c. Groundwater recharge, annual | 2,200,000 acre-feet |

Little Smoky Valley is a part of the physiographic province known as the Great Basin. This area is characterized by internal drainage and numerous intermittent streams draining into playas which occupy the lowest elevations in the valleys. The subject area of the EAR covers a portion of the northern and southern parts of Little Smoky Valley. No permanent streams occur in the area of the report and only one spring (unnamed) occurs in the Moody Mountains although other springs arise at Willow Creek Ranch Indian Spring Ranch, and Snowball Ranch and flow for a short distance into the study area.

Ground water moves northward toward a discharge point around Fish Creek Springs and Newark Valley. Toward the south, movement of ground water is toward the south away from an apparent ground water divide near the small closed basin in T.12N., R.53E. The southern ground water component apparently discharges from springs in the vicinity of Lockes in Railroad Valley. Estimated underflow from the northern part of Little Smoky Valley is 1,000 acre/feet-year and about 2,300 acre/feet-year from the southern part of the valley. Surface outflow is ephemeral and exists only for short periods of high runoff in Fish Creek to Newark Valley. No surface outflow occurs from the southern portion of the valley. Intermittent streams in the valleys are Willow Creek and Snowball Creek plus Big Sand Springs Wash.

The average estimated precipitation for the area, based upon average annual precipitation/altitude relationships indicate a range between 6 and 16 inches per year based upon increasing altitude.

Recharge to the ground water body occurs as infiltration into the pediment alluvial materials from mountain runoff. The amount of runoff for the northern part of Little Smoky Valley (total) is estimated at 4,000 acre-feet. The southern part of the valley receives an estimated 1,400 acre-feet and the study area itself

receives a percentage of this amount. Storage and perennial yield are 1,600,000 and 5,000 acre-feet (including the Fish Creek Springs used discharge) for the northern area and 940,000 and 1,000 acre-feet for the southern area.

The frail soil condition of arid climates is subject to heavy erosion during periods of high intensity summer storms. Flash floods, resulting from such precipitation patterns, move large volumes of sediment material over short time periods. Debris from such events tends to be deposited either at the mouths of canyons or, ultimately, in the playa areas. The rate of erosion is generally low in the area except for some portions of Big Sand Springs Wash. Actual values of erosion lie between 0.1 tons/acre/year and 0.3 tons/acre/year or somewhat less than 0.2 AF/sq.mi./year.

Although there is a potential for flooding and sheet wash damage, it is a very minor factor. The estimated recurrence interval for storms of one inch per hour (a potentially damaging situation for soil loss) is one event every 3 years.

Little information is available on water quality. Table 2-2 contains some general chemical analysis information on waters in the study area.

5. Air

The air appears to be generally of high quality in the area and would reasonably be expected to represent an undeveloped area. The Nevada Department of Human Resources has established and maintains air quality monitoring stations in Tonopah, Gabbs, and Ely. No air monitoring stations were established in Little Smoky Valley, either on a temporary or long-term basis. The entire State of Nevada falls within a Class II air quality region. Because there are no air monitoring stations in the study area, no specific air quality data is available. Ely, Nevada, about 60 miles northeast, is the closest such monitored area.

The prevailing wind is from the west along with occasional north wind components in the winter months. High intensity winds are generally accompanied by dust or sand storms. High summer temperatures give rise to dust devils, those ephemeral vertical columns of swirling dust so common in the southwestern desert country of the United States.

Topographic features, such as those which are common in Basin and Range country, frequently control air movement patterns. This control results in air movement up and down mountain slopes in

TABLE 2-2

Chemical analyses of water from selected wells and springs

Chemical constituents in parts per million

(Field analyses by the U.S. Geological Survey)

Location	Date of collection	Source type	Temperature (°F)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)		Chloride (Cl)	Sulfate (SO ₄)	Calcium magnesium non-carbonate (micro-mhos at 25°C)	Hardness as CaCO ₃	pH	Irrigation Quality		Rock Source			
						Calcium	Magnesium						Salinity hazard	Alkalinity hazard				
LITTLE SMOKY VALLEY																		
15/54-6d1	10-20-65	well	57	30	4.6	16	126	0	6.6	20	94	0	254	7.6	medium	low	safe calcium bicarbonate	alluvium
c 16/53-8a1	8-30-65	springs	63	28	29	38	267	0	11.0	37	191	0	444	8.2	medium	low	safe bicarbonate	limestone
16/539c1	8-29-65	springs	64	37	29	36	273	0	8.6	51	211	0	462	8.2	medium	low	safe bicarbonate	limestone
17/54-16b1	10-20-65	well	57	28	24	31	219	0	9.0	42	169	0	409	7.9	medium	low	safe bicarbonate	alluvium

response to diurnal heating and cooling with areas of high velocity air movement occurring in canyons which concentrate the general air mass movement into confined zones.

Air inversion conditions exist in the valley and are especially associated with late winter weather when calm periods persist for several days in succession. Such conditions, in conjunction with the prevalence of inversion conditions, lead to periods of air stagnation and a buildup of air pollution concentration levels. Between 50 and 60 days per year can be expected to have high air pollution potential in the valley although the lack of development in the area would tend to minimize such events.

6. Land Uses

Little use of the land area is being made. Use is confined to grazing and utilization by wildlife such as antelope, sage grouse, chukar, deer and by wild horses. There is no irrigated farming due to the remoteness of the area and the lack of adequate ground water supplies for such activities.

There is about 80 acres of private land within the study area. According to 1970 census data, there are no permanent residents within the area. Closest population centers are Tonopah (population 2,000) 80 miles southwest and Ely (population 7,100) about 60 miles northeast. The Duckwater area contains about 130 people and is due east about 10 miles.

Other activities in the area include occasional prospecting, hunting, some off-road vehicle use, pine nut picking by Indians as well as the Caucasian population, and some wood harvesting. There are three cow outfits and one sheep outfit which graze the area, containing an estimated 15,700 AUM's of forage. There are no major highways located in the study area.

B. Living Components

1. Vegetation

The Duckwater URA Step 2 - Vegetation indicates that there are three vegetation types: the Northern Desert Shrub, the Salt Desert Shrub, and Pinyon-Juniper. Forbs and barren areas also exist but in small amounts. General information pertaining to the vegetative types follow. (If more information is needed or desired, see the Duckwater URA Step 2 Vegetation and Step 3 Livestock Forage.)

The Sagebrush Type occupies approximately 68 percent of the study area. It occurs on the upland fans and benches, and low lying foothills and on up into the lower mountainous areas. Annual precipitation ranges from 8 to 15 inches. Most of the need to increase vegetative cover falls within this type. At present, grasses and other understory species are sparse over much of the area and sagebrush (Artemisia spp.) VIRTUALLY DOMINATES. Other species natural to the type include Nevada ephedra (Ephedra nevadensis), spiny hopsage (Grayia spinosa), Sanberg's blue grass (Poa secunda), wildrye (Elymus spp.), bluebunch wheatgrass (Agropyron spicatum), squirrel tail (Sitanion hystrix), needle-and-thread grass (Stipa spp.), Indian ricegrass (Oryzopsis hymenoides) and various forbs.

The Salt Desert Shrub Type makes up about 19 percent of the study area. This type is found largely on the bottom lands and alluvial fans where annual precipitation is less than 8 inches. Greasewood (Sarcobatus spp.), shadscale (Atriplex confertifolia), fourwing saltbush (Atriplex canescens), black sagebrush (Artemisia nova), horsebrush (Tetradymia spp.), and rabbitbrush (Chrysothamnus spp.) are the principal shrubs. Winterfat (Eurotia lanata) occurs in fairly broad solid stands or intermixed with the shrub types. Great Basin wildrye (Elymus cinereus), salt grass, (Distichillia stricta), galleta grass (Hilaria jamesii), alkali sacaton (Sporobalus airoides), Indian ricegrass, squirrel tail, and various forbs are also common to the type.

The Pinyon-Juniper Type is a native to the higher mountainous areas and is spreading onto the lower bench areas. At present about 13 percent of the unit supports a growth of pinyon-juniper. The type usually occurs on shallow soiled slopes in the 12 to 18 annual precipitation zone. Single leaf pinyon pine (Pinus monophylla) and Utah juniper (Juniperus osteosperma) are the two species represented. Other associated species include sagebrush, wheat-grasses (Agropyron spp.), bluegrasses (Poa spp.), and various forbs.¹

Acres breakdown is as follows:

<u>TYPE</u>	<u>ACREAGE</u>	<u>PERCENT</u>
Pinyon-Juniper	41,900	13
Sagebrush	215,700	68
Salt Desert Shrub	<u>59,200</u>	<u>19</u>
	316,800	100

There are few areas for aquatic plants and these are mainly around the area's limited springs. There are no known rare and/or endangered plants in the study area. There is very little riparian vegetation.

2. Animals

a. Terrestrial - Big Game

Three species of big game occupy the Little Smoky Valley Oil and Gas Study area: mule deer, antelope, and mountain lion. The Park and Pancake Ranges are primarily winter range for mule deer (Figure 2-1). Most of the deer migrate out of the area during the summer. No crucial habitat has been identified. The Pancake Range lacks adequate water for the deer even in the winter.

A small herd of approximately 16 pronghorn antelope occupy the Big Sand Spring and Little Smoky Valleys (Figure 2-1). The animals are restricted to the valley benches and bottom. No crucial habitat has been identified. The limiting factor for antelope appears to be the lack of and poor distribution of water.

Mountain lion habitat areas overlap mule deer areas. Mountain lions are believed to migrate to and from these ranges with the mule deer populations. No crucial habitat areas have been identified. Lions are generally very secretive and will avoid man if possible even to the extent of moving out of areas occupied by man.

Other mammals occurring in the area range from coyotes to ground squirrels. Riparian habitat associated with all waters are considered crucial habitat for mammals throughout the area.

b. Wild Horses - West Half Duckwater (Figure 2-2)

The URA for Duckwater indicates there are 308 horses in the Sand Springs herd unit, based on a 1975 helicopter inventory of the area. In that inventory, an estimated 14 percent of the horses were missed. Adding this figure, plus a very conservative annual increase, the 1977 estimate for the Sand Springs herd is 424 horses.

Water is limited in the Sand Springs area and all water sources within the herd unit are very important to the horses.

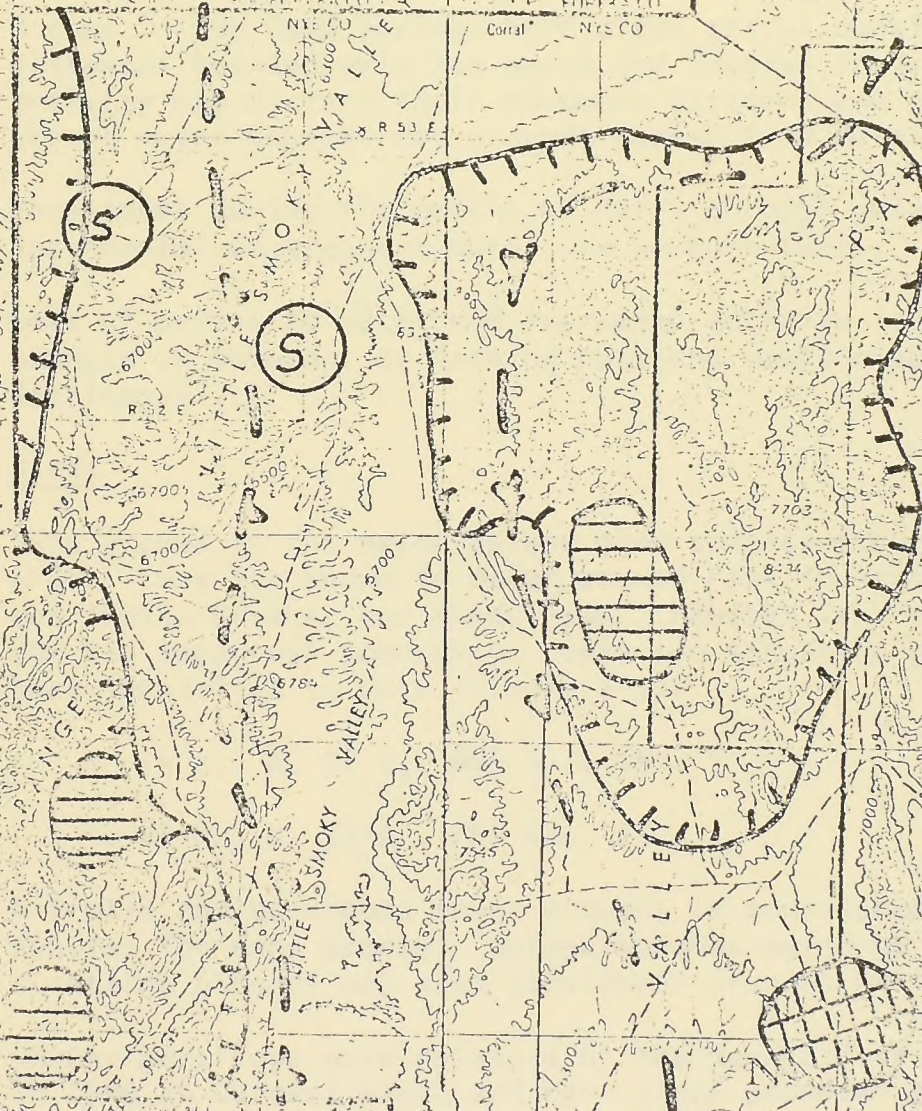
FIGURE 2-1

R 52 E

R 53 E

R 55 E

WILDLIFE HABITAT AREAS



LEGEND



Deer Winter Range



Sage Grouse Habitat-Crucial



Sage Grouse Habitat-Yearlong



Chukar Habitat-Yearlong



Antelope-Yearlong

Pinyon-juniper areas are used primarily for cover and protection from the elements, while the large winterfat stands and areas where grasses are present in sufficient amounts to graze are used as foraging areas.

Horses in the Sand Springs herd often travel considerable distances between watering areas and feeding areas. Increased activity may disrupt their movement patterns and activity around water sources may prevent horses from obtaining water.

Harassment during the months of March through July may be detrimental to pregnant mares and newborn foals.

Loss of access to water and increased activity leading to changes in movement or feeding patterns could also be very detrimental.

c. Birds

Sage grouse is the major upland game species occurring in the area. They are known to occur around Park Mountain, Snowball and Indian Creeks, and Moody Peak. Habitat is primarily in the big sagebrush community. Only two strutting grounds have been identified to date (Figure 2-1):

T. 14 N., R. 52 E., NW $\frac{1}{4}$ Sec. 16

T. 14 N., R. 52 E., NE $\frac{1}{4}$ Sec. 25

A 2-mile radius around these grounds is considered crucial habitat for sage grouse. Upland meadows adjacent to the strutting grounds are also considered crucial habitat.

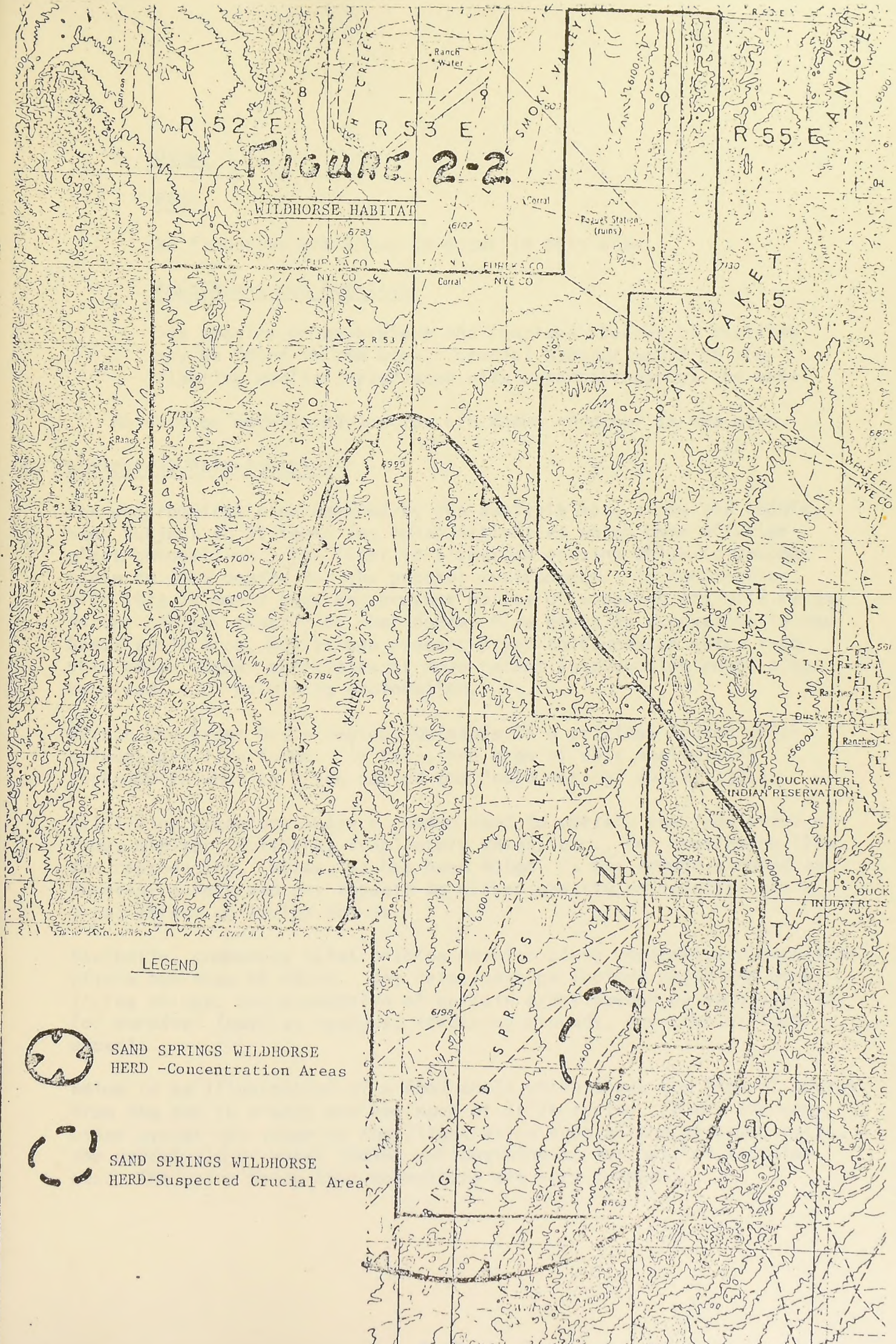
Chukar partridge were released by the Nevada Fish and Game in 1940 at Current Ranch and have since expanded their habitat into the leasing area. Chukar occupy the rugged rocky hillsides which have an adequate annual seed crop. Water is the key to chukar distribution. During the dry summer months, chukar are seldom found more than a mile from water. All waters in chukar habitat are considered crucial.

Mourning doves use the entire area for spring, summer, and fall habitat. Although doves will travel long distances to water, all waters are considered crucial to mourning doves.

Many species of raptors and song birds occur in the area. The only crucial habitat identified is riparian habitat in association with water throughout the area.

FIGURE 2-2

WILDHORSE HABITAT



LEGEND



SAND SPRINGS WILDHORSE
HERD -Concentration Areas



SAND SPRINGS WILDHORSE
HERD -Suspected Crucial Area

d. Other

Fish

No fisheries are known to occur in this area.

Amphibians and Reptiles

Six species of amphibians and fourteen species of reptiles may be found in the area. Crucial habitat would be the riparian habitat associated with water throughout the area.

No rare or endangered species are known to occur in the area.

C. Ecological Relationships

The geographical area covered by the analysis has, since the 1880's, been subject to at least two human activities which have affected plant composition. The first is livestock grazing which is responsible to some degree for the present environment. In conjunction with this is man's past and present policy of stopping all wild fires. No one can say exactly to what degree fire plays in succession in the Great Basin area, but it was present prior to Caucasian entry into this area. Other activities of more recent introduction could also be cited, such as mining exploration.

Within the Great Basin region, moisture is a critical factor which affects all life forms. In fact, the area of this analysis is included in what is often called the "cold desert" (Odum, 1971).

All living organisms share a common need to satisfy the requisites of food, shelter, moisture, respiratory gases, etc., for continuing life and reproducing. Water, as has been noted, is the common element in shortest supply and any impacts on either quality or quantity has a great effect on living things.

Basically, community relationships develop along vegetative communities within the area of study. Key relationships include water and other living things, and protection of certain areas needed by some species for survival (such as meadows, strutting grounds, and crucial food areas).

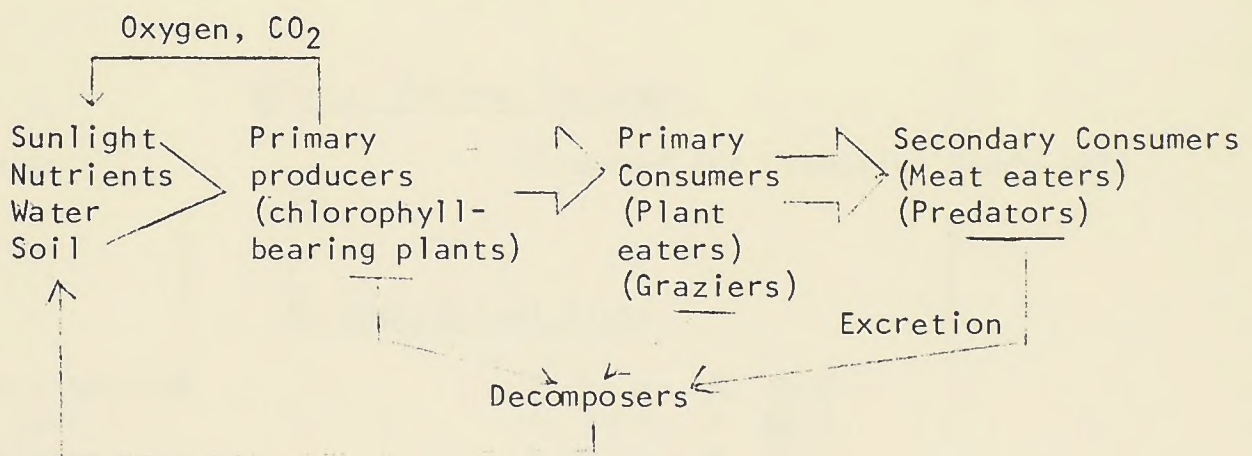
Below is an illustration of a food chain which shows the flow of energy from the sun to plants and how some of it is cycled. There are many other cycles not shown on the illustration such as the nitrogen cycle, the hydrologic or water cycle, various mineral (or nutrient) cycles, etc. The point being that ecosystems are very complex.

Available moisture and temperature are also critical elements in the food chain although the simple one as shown does not provide this information.

The food chain is, as stated, really an energy flow from the sun through various organisms. Disruption of the food chain during certain portions of the year can be as hazardous to some wildlife species as elimination of a watering area or removal of too much cover.

As previously discussed, only two crucial areas have been located to date and these are for sage grouse. Water is more crucial to most animals than it is to most plant life because most plants can go into dormancy and reduce their water losses. Few of the animals in this unit have this capability. Of course, any new water sources found or developed have a very positive impact on all species.

A typical example of a food chain is as follows:



D. Human Interest Values

There are no developed, designated, or segregated recreation areas in the proposed action area. There are numerous existing historic and archaeologic sites some of which have potential for interpretation. In addition, there are two areas which have been identified as being geologically significant. The Park Range is the most notable of these two. It has been proposed for a primitive area study. A Park Range RIS has been completed, but a final determination as to a recommendation has not been made.

The proposed action area supports a large wild horse population (Figure 2-2). The valley has a small population of antelope which are hunted. The benches and hills adjacent to the valley support sage grouse, and chukar partridge which are also hunted. Mule deer are also hunted in this area. Mountain lion can also be found in the higher elevations of the proposed action area, and these are also hunted.

TABLE 2-3

HISTORICAL AND ARCHAEOLOGICAL SITES

(See Figure 2-3)

Historical Sites

<u>Name</u>	<u>Description</u>
1. Willow Creek Ranch	T. 14 N., R. 52 E., Sec. 19 (private)
2. Burnt Station	T. 12 N., R. 53 E., Sec. 7
3. Pogue's Station	T. 13 N., R. 54 E., Sec. 33
4. Rock Island	T. 13 N., R. 52 E., Sec. 35 and 36
5. Park Range Cabin	T. 13 N., R. 52 E., Sec. 20
6. Moody Buildings (Remnants)	T. 14 N., R. 53 E., Sec. 26
7. Sand Spring	T. 13½ N., R. 54 E., Sec. 33
8. Sand Springs	T. 12 N., R. 55 E., Sec. 6

General Recreation Areas

- | | |
|---------------|------------------------------------|
| 1. Park Range | Proposed for Primitive Study 1974. |
|---------------|------------------------------------|

Archaeological Sites

A. Portugese Station	T. 11 N., R. 55 E.,
B. Martin Spring	T. 10 N., R. 54 E.,
C. Cliff Plateau	T. 12 N., R. 52 E.,
D. Hildebrand Spring	T. 12 N., R. 52 E.,
E. Cottonwood Plateau	T. 12 N., R. 51 E.,
F. Park Mountain Spring	T. 12 N., R. 52 E.,
G. Cross Roads	T. 13 N., R. 52 E.,
H. Bassitt Springs	T. 12 N., R. 52 E.,
I. Trail I	T. 12 N., R. 52 E.,

VRM classes have not been applied to this area yet. However, the scenery has been rated in the RIS with the valley receiving a "C" rating which is the lowest rating an area can receive. This rating is based on criteria including, uniqueness of land forms, variety, color, vegetation, water, and intrusions. The adjoining Park Range to the west and Pancake Range to the east received a "B" rating. The subject area is fairly remote and has not been subject to intrusions which detract from the visual quality as yet.

Adjacent to the proposed action area in the Battle Mountain District is the Morey Peak area which has been recommended for primitive designation. The southern portion of the study area is visible from Morey Peak. Also in this area is Moores Station which is on the National Register of Historic Places. It is in Battle Mountain District.

The remoteness and relatively natural condition of the proposed action area has some potential for recreational sightseeing for persons interested in viewing a relatively unchanged landscape. With the designation of Morey Peak, this type of visitation could be expected to increase somewhat. Historic trails which pass through the area include Goldfield-Palisade, Eureka-Tybo, and Pioche-Palisade stage freight routes (See Map 2-3 and Table 2-3).

The Duckwater Management Framework Plan (MFP) which was completed in 1974 has several recommendations which affect the proposed action. The Park Range was recommended for a primitive study and evaluation of that study. This means that the Park Range could be withdrawn for energy leasing. The study is currently in draft form awaiting final comments, EAR's, and a decision.

Prehistory and Archaeology

The prehistory and archaeology of the Little Smoky Valley is not well documented. Steward's book Basin-Plateau Aboriginal Sociopolitical Groups gives a general prehistorical and historical account of the aboriginal occupation of the Little Smoky Valley and vicinity, which includes the Park Range. During the Recreation Inventory, a survey was made to determine the archaeological values of the area. This was accomplished by several daylong, on foot surveys at various locations throughout the area as well as a 4-day backpack survey over the southern portion of the inventory area.

Prehistory

At present there is little historical depth in the picture of Basin-Plateau Cultures. Archaeological evidence of ancient cultures is almost negligible, particularly in comparison to the nearby Southwest. There is enough evidence to show that the area was occupied for a very long

period, perhaps as long as 10,000 years or more before present, by simple hunting and gathering peoples. The old cultures cannot, however, be adequately characterized until more research has been carried on.

The Little Smoky Valley area was inhabited by Paiute and Shoshone cultures. They engaged in the hunting of deer, antelope, rabbit, and other small game and birds as well as the gathering of pine nuts, indigenous plants, roots, and insects. Their camp areas were located near sources of water which was necessary for their existence and that of the animals they hunted. The Indians contact with the White Man may be divided into four periods: (1) Exploration and penetration of the territory by trappers, approximately 1776 to 1840; (2) immigration which usually passed on through the country to more fertile lands on the coast, but settled Utah and the Humboldt Valley, 1840 to 1860; (3) settlements by miners and agriculturists and the climax of strife between Whites and Indians, 1860 to 1870; (4) removal of many Indians to reservations where many still remain.

The decade following 1860 brought the crisis for most of the Basin-Plateau peoples. In 1857 the great Comstock lode at Virginia City had been discovered in western Nevada. Within 10 years, prospectors penetrated the remotest parts of the territory, and boom towns sprang up in the midst of sheer desert. The Shoshone, who had little previous contact with the White Man, congregated at many of these towns. Meanwhile, immigrants had begun to settle at oases in the desert and soon livestock grazed the hills, decimating native food plants and settlers cut down pinyon trees for fuel. In 1869, the railroad across the continent was completed and the native period was at an end.

Shoshone of central Nevada and of the more remote valleys seem to have kept out of the major conflicts with the White Man. The treaty of 1863 included all the Shoshoni of northern Nevada. They were given the Western Shoshone or Duck Valley Reservation in 1877, but by no means all Shoshone went to it. A few of the more westerly Shoshone joined Paiute on reservations in western Nevada, but most remained near their native land, gradually abandoning their native economy and attaching themselves to ranches or mining towns. The last vestiges of Indians from the Little Smoky Valley^{area} were recorded in the 1880's. They lived in and around Snowball, Hot Creek and Little Smoky Valley. There were 14 families or about 96 persons.

Archaeological Values (See Table 2-3)

The walkover survey conducted on portions of the Little Smoky Valley turned up 9 archaeological sites. All of the sites were quite similar in identifiable artifactual assemblage. Potsherds, waste flakes, and projectile points were collected off most of the sites when they were

of a diagnostic quality. These artifacts will be sent to the Nevada State Museum for cataloging and storage along with BLM Cultural Resource Reports. Eight of the sites have been assigned BLM site numbers as these sites were located on Ely District lands. Three sites located at the southern portion of the Park Range near Pritchards Station were not assigned BLM site numbers yet as they are located in the Battle Mountain District. Final conclusions pertaining to archaeological values follow:

A thorough archaeological assessment of the Little Smoky Valley is not possible at this time due to inadequate survey coverage. Some conclusions can be made about the archaeological values of the area from the sites that were recorded.

In every instance there was water or nearby water associated with the aboriginal sites. Each of the sites consisted of small to large (up to 4 square miles) lithic scatters. The waste flakes, chips and projectile points were produced from obsidian, various cherts, basalts, and quartz. The isolated find of potsherds on a cliff plateau above Tank Springs has been identified as Shoshoni grayware. All of the sites are typical of the surrounding area and are not particularly significant in themselves but are useful for a better understanding of aboriginal land use patterns. There is a very high probability of further archaeological sites in the area, particularly in the spring areas which were not surveyed by an archaeologist.

E. Socio-Cultural Interests

There are no transportation or transmission systems which cross this area. Two major east-west routes be outside of the study area to the north and south.

Currently there is much oil activity to the southeast in Nye County. People in Ely, Nevada, especially business people, have expectations of some oil activity crossing into White Pine County and pumping new money into this basically copper mining town. The same is no doubt true of residents in Currant or Duckwater, Nevada; any chance to increase income or the tax base would be welcomed.

Any large development, however, would have an impact on the social services and values held by the smaller towns and possibly even on Ely.

The major known ethnic values in the area are concerned with the Indians and their interest in pine nut harvesting. It is doubtful that any of them require the nuts solely as a base food; but perhaps, out of cultural ties with their ancestors, the nuts are important to them.

CHAPTER III ANALYSIS OF THE PROPOSED ACTION AND ALTERNATIVES

A. Introduction

The proposed action is to lease Federally owned lands under U.S.D.I. regulations and standard stipulations for the development of oil and gas resources. Two alternatives to the proposed action have been cited: I. Lease Federal lands under U.S.D.I. regulations and standard stipulations with the addition of special mitigating measures; and II, Allow no oil and gas leasing in the study area. Alternative I implies that exploration would occur in the lease area, and it is possible that all stages of implementation listed in Chapter I would follow. (For a detailed description of the stages of implementation, please see Technical Report accompanying this report.) These operations would have various adverse and beneficial impacts on the environment, vegetation, wildlife, and man. The impacts may be negligible, tolerable, tolerable only when subject to special mitigating measures, or intolerable, requiring that no leasing be allowed in certain areas. The following discussion analyzes the impact of the various stages of implementation and their discrete operations on the ecosystem.

B. Anticipated Impacts - General

The various stages of implementation result in impacts of differing intensity on the environment (i.e., some operations affect larger areas than others, some have more harmful effects on the surroundings than others). Construction, an integral part of each stage, is the most prevalent and one of the most damaging of the discrete operations. During the development stage, construction activity is at its peak, and therefore, the related impacts are generally of the highest intensity (i.e., most damaging to the environment). The production stage usually involves lower intensity impacts, although high intensity impacts initiated during development may continue through production. Exploration and closeout stages generally result in impacts of lower intensity than those associated with development and production.

C. Anticipated Impacts - Non-Living Components

Air

The impact on air quality of the operations associated with energy development would be the introduction of three types of air pollution: airborne particulate matter, gases, and noise.

Construction operations and road travel would introduce fugitive dust to the atmosphere. Also, the dust plumes trailing vehicles are considered by some people to be unsightly.

Gaseous emissions would be associated with all stages of implementation. Vehicles, rig diesels, and derrick pumps would release hydrocarbon combustion gases to the atmosphere. Natural gas may leak from well heads and pipelines, and flaring of natural gas would lower air quality in the vicinity of the exploratory well. However, no natural gas has yet been discovered in Nevada, and the occurrence of the two preceding impacts would be highly unlikely. Other possible sources of air pollution **which** have a very small chance of occurring are oil well fires, burning sump pits, and paraffin cutting.

The noise produced during heavy equipment operation and drilling would be considerable in localized areas. The relative silence of the valleys would be intermittently disrupted. Wildlife and livestock may be frightened from the immediate area.

In general, the adverse impacts on air quality would be localized, measurable on a site specific basis only, and only under unusual circumstances would they affect large areas.

Land

The development of oil and gas energy in the study area would result in several types of adverse impacts on the land, including soil pollution and erosion, and conflicts of land use suitability and compatibility.

Soil Erosion

Off-road vehicular activity, road construction, drill pad "scalping," and all other activities involving removal of vegetative cover and disruption of the soil would greatly increase wind and water erosion of the land surface. Surface operations on sloping ground would result in severe erosion during periods of excessive runoff. Localized areas would be subject to high intensity, adverse impact.

Soil Pollutants

Accidental oil spills, sump ponds, waste disposal pits, and breaching of evaporation ponds are the major sources of soil pollution resulting from the various stages of implementation. Although the damaging effects of these pollutants would be localized, the slow nature of soil development in the desert environment means that these impacts would occur over an extended period of time. A major oil spill, or breaching of sump or evaporation ponds by flood waters would result in a high intensity impact over a relatively extensive area.

Land Use Suitability

Some areas cannot tolerate the impact imposed by even the exploration phase of oil and gas energy resource development. Any surface operations within these areas would irreversibly disrupt or destroy crucial wildlife habitat, cultural resources, fragile vegetative resources, water sources, or other valuable natural resources. These areas which require special occupancy stipulations or are to be excluded from leasing, are listed in the Mitigating Action section of this chapter.

Land Use Compatibility

Generally, the impact of exploration on adjacent withdrawn lands may include disruption of scenic beauty, disturbance of wildlife as a result of noise and human activity, and disruption of waterflow or changes in water quality. For exploration, these impacts would probably be temporary in nature and of low intensity. However, development and production would have much higher intensity impacts on surrounding or adjacent protected areas, primarily as a result of the prolonged period of time over which they would occur.

Water

The development of energy resources in the study area could have significant negative impacts on both surface and groundwater. The increased erosion resulting from construction would increase the sediment load and turbidity of streams. Increasing the bed load would lead to silting of ponded water and decreasing the oxygen content of the water. Road and drill pad construction may alter drainage patterns, drying up present creek beds and creating the potential for flood conditions in other areas. Exploratory drilling may also contaminate or disrupt the flow of aquifers. Heavy use of local water supplies during drilling could lower the water table or diminish flow available to vegetation, wildlife, livestock, and man. The limited availability of water in the region means that these impacts could have lasting, damaging effects on vegetation, wildlife, wild horses and human interests.

The various stages of implementation could also result in more localized, more temporary impacts on water quality. The removal of oil or water from subsurface strata may result in subsidence of the land surface leading to increased flooding. Surface water may be contaminated by breaching of sump pits, oil leaks and spills, breaching of evaporation ponds, and/or waste disposal pits. Changes in water chemistry as a result of pollution can destroy aquatic and riparian vegetation, which also deprives small game of a food source. Although these impacts may be localized and temporary, the dependence of vegetation, wildlife, horses and man on water means that the impacts would be of high intensity on the ecosystem of the area affected.

On the other hand, exploratory drilling very often has a beneficial impact on the available water resources of an area. In many cases, exploratory wells yield potable water, and, upon abandonment, can provide new water sources for the environment.

D. Anticipated Impacts - Living Components

1. Plants

Terrestrial Plants

Any grading, bulldozing, or "scalping" operation destroys or changes the vegetative cover and allows the introduction of invader species such as halogeton. Certain species are very fragile and would be damaged or destroyed by off-road vehicular activity. The damaging effects would be localized and of high intensity.

Soil pollutants as discussed under impacts on the land, would damage or destroy terrestrial plants. Oil is particularly lethal to plants and a major oil spill would result in a high intensity, negative impact over a relatively large area.

Those impacts affecting water would also pertain to terrestrial plants. Lowering of the water table, increased flooding, and water pollution would adversely affect these plants.

For the study area as a whole, the impact would probably be of low intensity. However, on a site specific basis, the impact could be of high intensity.

2. Animals

General

Any human activity in an area frequently leads to harassment of wildlife, sometimes including indiscriminate and illegal hunting or capturing. Construction of new roads and vehicular activity always increases the chances of road kills for both livestock and wildlife. In addition, any loss of vegetative cover due to construction would reduce the amount of forage available. It is estimated that 25 percent of the land surface of a given area is disturbed or occupied by a producing oil field. The intensity of these impacts would be low during exploration, and for development and production, the impacts would probably be of moderate intensity.

Big Game (Figure 2-1)

High intensity adverse impacts could occur on a seasonal basis for the big game of the area as a result of the discrete operations associated with energy resource development. Reduction of forage due to construction or pollution, disruption, depletion, or pollution of water sources, vehicular activity, noise from drilling and construction, and human activity would greatly disturb the winter feeding ranges of mule deer and the spring kidding grounds of antelope. For mountain lion, any surface operations within their habitat in any season would result in a high intensity, negative impact. Special mitigating measures should be attached to protect the seasonal, critical ranges for mule deer and antelope.

Upland Game (Figure 2-1)

Sage grouse strutting grounds are crucial to the reproduction of these game birds. Any surface operations within either the strutting grounds or brooding meadows during the mating and brooding seasons would seriously disrupt breeding and brooding activities. The brooding meadows are critical to the survival of the chick population, and therefore, any operations which would destroy vegetation or disturb the nesting areas would seriously affect the game bird population. As previously noted, water holes and springs are crucial areas for chukar partridge, small mammals and mourning doves. Any energy related activity which would destroy or disrupt the areas adjacent to the water areas or which would destroy the waters would have a detrimental effect on these species. Mitigating measures should be attached to protect sage grouse, chukar, and mourning dove critical areas on a seasonal basis.

Livestock

Any adverse impact imposed upon the quality and/or quantity of water (see impacts on water) would directly affect the availability of water for livestock. Clearing of vegetation during construction operations, or destruction of plants due to soil or water pollution, would reduce forage and open areas to invader species such as halogeton, which are detrimental to livestock. These negative impacts would most likely be local in scope and of relatively low intensity.

The possibility of tapping new water sources through exploratory drilling would be a positive impact for livestock.

Wild Horses (Figure 2-2)

As is the case for livestock and wildlife, any adverse impact on the quality or quantity of water sources as a result of energy resource development would have damaging effects on the wild horse population of the area. In addition, heavily traveled roads, which would occur during the development and production stages, would restrict free-roaming horses. However, no crucial habitat for wild horses has been identified in the study area and the overall impact of energy resource development with respect to wild horses is expected to be low.

3. Human Interest Values

Conflicts of Use

As discussed in the section on land-use suitability, a few locations within the study area have human interest value such that they would be subject to intolerably high intensity, negative impacts as a result of onsite surface operations. Such areas include but are not limited to those of scientific or educational interest, recreation areas, scenic areas, roadless areas, and water resources. Specific areas are described in the mitigating actions section of this report.

Public Safety

Public safety could be adversely affected in several ways by the development of energy resources in the area. Health hazards could be posed by the pollution or disruption of water supplies, the emission of noxious gases from exploratory wells, and the possibility of oil well fires or well blowouts. Movement of heavy equipment along roads could present a danger to motorists using roads for recreation purposes.

Visual Impacts

The various stages of implementation can have a very real effect on the visual aspect of the environment. Drill rigs, powerlines, pipelines, oil derricks, and geothermal power plants would disrupt the "unspoiled expanse of nature" feeling which is very valuable to many people. During the exploration stage, off-road vehicular activity would result in more unsightly tracks across the valleys, new roads, dust plumes from increased road use, and abandoned drill pads stripped of vegetation. These would all be unavoidable "eyesores" in the natural environment.

Economic Impact

The development of a producing oil field in the study area could have a moderate, beneficial impact on the economy of White Pine and Nye Counties. The influx of exploration and construction crews would bring new and needed capital to the region. The leasing of Federal land in the county would produce revenue for the Federal and state governments and the county.

Also, the development of energy resources in the study area would contribute to relieving the energy shortage in our country.

E. Implementation of Alternative II

Implementation of Alternative II would result in no oil and gas leasing in areas. This action would have a negative impact on the economic conditions of the region. There would be no influx of capital into the depressed economy of White Pine and Nye Counties. The Federal and state governments would lose the revenue that would have been gained through leasing application and rental fees and possible production royalties. There would be no development of possible energy resources which is contrary to the national energy policy and presidential directives concerning energy resource development. And, at the local level, there would be no development of undiscovered water resources through exploratory drilling.

Implementation of Alternative II would have a broad based beneficial impact on the ecosystem. None of the negative impacts on wildlife, vegetation, or human interest values described in this chapter would be realized.

F. Recommended Mitigating or Enhancing Measures

General

Most of the adverse impacts on the ecosystem resulting from oil and gas energy development can be mitigated through enforcement of applicable Federal, state, and local laws and regulations, and lease and land use permit stipulations. Specific requirements and authority for protecting the environment from the impact of energy development are contained in particular regulations for oil and gas leasing and exploration, operating regulations, and the secretarial operating orders, including:

1. Regulations for Oil and Gas Leasing CFR 43, parts 3000, 3100
2. Non-Competitive Public Domain Lease (Form 3120-3)
 - a. Section 2 paragraph q, Protection of the Surface

3. Notice of Intent to Conduct Oil and Gas Exploration Operations (Form 3040-1)
4. Surface Disturbance Stipulations (Form 3109-5)
5. Secretarial Order No. 2948 (IM 74-478, IM NSO 75-13, IM 77-74)

Air, soil, and water pollution, and soil erosion would be partially mitigated by the authority and requirements contained in the regulations, permits, and leases. Specific mitigating measures for protecting the environment are listed below. Unanticipated environmental impacts which become apparent as a result of oil and/or gas resource development will be mitigated before implementation of the required plan of operation.

Protection of Air Quality

1. The air quality standards as established for the State of Nevada shall be adhered to and will partially mitigate impacts on air quality.
2. Surface burning of waste material will not be allowed.
3. When dusty conditions develop with road use, dust abatement measures will be required.

Protection of the Land Surface

1. All garbage, debris, and foreign matter will be moved to a legally established solid waste disposal facility.
2. Where off-road travel is necessary, vehicles should be confined to a single route where possible and should follow the contour of the land as much as practicable.
3. During clearing operations, topsoil must be stockpiled for subsequent rehabilitation work.
4. Road use may be restricted during periods of excessive runoff to prevent cutting and surface damage.

Protection of Water Supply and Quality

1. Any discharge of groundwater into surface waters of the subject area will be in accordance with State water quality standards.
2. If briny waters are encountered, steps must be taken to prevent entry into and contamination of fresh ground and/or surface water.

3. Every effort should be made to prevent oil spills. The following preventive measures should be taken:

- a. Onsite supervisory personnel should have training in the proper techniques of handling and cleanup of oil spills.
- b. Emergency access to earth moving equipment and straw or other oil absorbing material is essential.
- c. Holding tanks should be surrounded by impermeable dikes or berms of sufficient capacity to hold the oil contained in the tanks.

Should an oil spill occur, the following emergency procedures should be followed:

- a. Stop or control the cause of the spill.
- b. If possible, contain the spill with temporary dikes or dams.
- c. Notify the appropriate officials.

Cleanup of Oil:

- a. Oil should be disposed of in a non-polluting manner. Oil will not be mixed with or covered by soil.
 - b. The area involved will be restored to approximate original condition.
 - c. Assessment of and payment for damages done.
4. Drill sites should be located away from drainages to minimize the contamination of surface waters. All sites within $\frac{1}{2}$ mile of live or ephemeral waters must have impermeable reservoirs capable of retaining drilling wastes or spills.
5. Surface water which affects aquatic and marsh habitat can only be utilized at or near its terminal point of flow. The amount of utilization will be determined by the land management agencies authorized officers.
6. Drill sites should be of sufficient distance from fresh cold water springs to minimize the chance of flow disruption. A recommended safe distance is at least $\frac{1}{4}$ mile but may vary with geologic structure.

7. Natural drainages should not be impeded by road fills. If these fills are necessary, they should be removed before spring runoff.
8. Surface occupancy within 500 feet (horizontal measurement) of any canal, ditch, slough, pond, lake, spring, or open body of water may be restricted or denied where deemed necessary by the appropriate surface management agency to protect vegetation, wildlife, wild horses and other resources.
9. Where danger of pollution to critical water supplies is high, it may be required that drilling waste fluids be transported to designated disposal areas.

Protection of Vegetation

1. Aquatic plants and riparian vegetation would be adequately protected by mitigating measures recommended for water quality and supply.
2. No surface occupancy will be allowed in identifiable pygmy sage areas.

Protection of Wildlife and Livestock

1. Drilling activities will be allowed within identified crucial mule deer winter ranges from April 1 through November 30.
2. Drilling activities will be allowed within identified antelope kidding grounds from May 1 through February 28.
3. No drilling activities will be allowed within identified sage grouse strutting grounds. On a seasonal basis, no drilling activities will be allowed within a 2-mile radius of the strutting grounds during the period March 1 to June 15.
4. Drilling activities will be allowed within identified crucial ranges for chukar during the period April 1 through November 30.
5. All sumps, evaporation ponds, etc., should be covered in some manner to prevent waterfowl from landing on the pits, etc., where this problem appears likely. Also, these areas should be fenced and flagged to prevent wildlife and livestock from using the water.
6. Wild horse watering areas are adequately protected by recommended mitigating measures for water quality and supply. Lessee should also be made aware of the Wild Horse Act.

7. Under Nevada law, it is unlawful for any person to camp within 100 yards of a small isolated spring, seep, water pocket or waterhole in such a manner that wildlife or domestic stock will be denied access to such water sources. Surface occupancy will be controlled in all such areas.

Protection of Human Interest Values

1. If antiquities or other objects of historic or scientific interest, including historic or prehistoric ruins, vertebrate fossils, or artifacts are discovered, they should be left intact and immediately brought to the attention of the District Manager.
2. All survey monuments, witness corners, reference monuments, and bearing trees should be protected against destruction, obliteration, or damage. The permittee should report any damage. The permittee should report any damage or obliterated markers to the BLM.
3. The Park Range should be closed to all leasing because of its current status of a wilderness study area.
4. Pipelines, power transmission lines, storage facilities, power plants, etc., will be constructed in accordance with BLM's MFP decisions in the Duckwater Unit for visual resource management.

G. Alternative 1

1. Residual Impacts

Through implementation of the mitigating measures, most adverse impacts would be eliminated or minimized. However, there may be significant impacts which could occur, despite adherence to the mitigating measures.

Air Quality

No significant residual impacts on air quality are anticipated. Fugitive dust cannot be completely suppressed but its impact should be low.

Water Quality and Supply

Accidental spills of oil are a potential problem. Destruction of or serious damage to aquatic and riparian habitats would disrupt the entire ecosystem, affecting vegetation, wildlife, livestock, and man. Although minor oil spills do occasionally occur, the operators usually do everything possible to prevent them, and a major oil spill would be unlikely.

Possible disruption or pollution of aquifers during drilling operations cannot be fully mitigated. The loss or pollution of springs would seriously affect the ecosystem for many years. The chances of this occurring are unpredictable and depend upon the subsurface geology.

Land

As for water, oil spills would be an unmitigatable source of pollution. Normally, these pollutants would seriously affect only a small area. However, the breaching of sump or evaporation ponds by flood waters could spread pollutants over a large area and this could occur even to well constructed dikes or berms.

Depending upon the extent of energy resource development in the area, the evidence of operations on the land surface could be visible for many years to come. Rehabilitation of disturbed areas would partially mitigate the impact of the surface disturbance, but the scars would remain.

The visual impact of energy development, the disruption of the open spaces, cannot be practicably mitigated. Power lines, pipelines, storage tanks, and power plants would all be inevitable "eyesores."

Vegetation

The loss of vegetative cover would be an integral part of each stage of implementation and is an impact which cannot be mitigated. Oil field development would result in an approximate 25 percent loss of vegetative cover within the production field. The size of the only production field in Nevada, to date, the Eagle Springs field, covers an area of roughly 1600 acres, and due to the geology of the region, it is highly unlikely that new fields would be much larger.

The unmitigated impacts affecting water and land would also have significant adverse impacts on vegetation.

Animals

Those unmitigated or partially mitigated impacts on water, land, and vegetation could have serious effects on wildlife and livestock through destruction of forage, water sources, and prey.

The harassment of wildlife and wild horses, whether merely a result of human activity in an area or through willful acts such as hunting or capture, is essentially an unmitigable impact.

The increased chance of road kills cannot be prevented and the number of such incidents would grow with greater amounts of road use during development and production.

The impact of roads on restricting the roaming patterns of wild horses cannot be mitigated. This would pose a serious problem only with extensive energy resource development of the area.

Human Interest Values

Even with rehabilitation, the evidence of man's surface disturbance will conflict with the natural scenic value. During development and production, and even after closeout, this partially mitigated impact could still be of high intensity.

The danger to public safety as a result of road use by heavy equipment cannot be fully mitigated. The chance of accidents would increase with development and production. However, this residual impact is expected to be of low intensity.

The construction of roads during exploration and development would provide access to previously inaccessible areas for the public. This would be a positive residual impact.

The development of water resources discovered during exploration drilling would be another positive residual impact resulting from energy resource development.

2. Relationship Between Short-Term Use and Long-Term Productivity

The two basic elements most significant in determining long-term productivity are soils and water. Loss of soil through clearing operations or pollution, would reduce the productivity of vegetation, wildlife, and livestock. Reduction or pollution of water supplies would reduce productivity of aquatic life-forms, waterfowl, wildlife, livestock, and could impact productivity of cropland.

Short-term use of the study area includes energy resource development. If no oil or gas resources are discovered in the area, exploration would be the only stage of implementation to affect the area and the short-term use would span only a few years at most. Long-term productivity of other resources would be subject to minimal impact.

Development and production would have a more significant effect on the long-term productivity of an area. Generally, the life-span of a producing oil field is 20 to 30 years, although a shorter period of time is often the case. Most likely, this short-term use would affect only small, scattered areas within the proposed leasing area. Upon closeout of production, disturbed lands would be rehabilitated and former uses restored as much as possible.

The long-term productivity of all land uses would depend upon the degree of development and surface disturbance. The more intensive and widespread use becomes, the greater will be the influence upon long-term productivity.

3. Irreversible and Irretrievable Commitments of Resource

General Commitments of Resource Associated with Energy Resource Development

- a. Long-term landscape scars resulting from construction and development activities within the energy producing fields. Also loss of roadless areas.
- b. Loss of specific populations of plants and animals would be irretrievable, but the same species could be reintroduced either naturally or artificially.
- c. Modification of the ecosystem would likely be irretrievable because of changes in vegetative cover resulting from construction and clearing operations. Changes in vegetation would also alter predator-prey populations.
- d. There could be loss of archaeological and historical features.
- e. There will be an irretrievable loss of lease revenue from areas excluded from leasing.

Commitment Resulting from Oil and Gas Energy Production

- a. Depletion of oil and gas resources.
- b. Possible depletion of water from the subsurface reservoir.

H. Alternative II

1. Residual Impacts

The loss of potential oil and gas resources would be unavoidable. Also, a substantial loss of lease revenue and possible loss of production royalties would result.

There would be a substantially reduced chance for development of undiscovered water sources.

There would be a substantially reduced chance for the stimulation of the economy of White Pine and Nye Counties.

2. Relationship Between Short-Term Use and Long-Term Productivity

There would be very little short-term energy development use which would interfere with the long-term productivity of other resources.

A delay in or loss of energy production would result and could cause setbacks in economic growth and productivity of the region.

3. Irreversible and Irretrievable Commitment of Resources

No irretrievable or irreversible commitment of natural resources would occur.

CHAPTER IV PUBLIC INTEREST AND PARTICIPANTS

A. Intensity

The recent discovery of a second oil field in Railroad Valley 20 miles southeast of the area has aroused increasing public interest in energy resource development in White Pine and Nye Counties. Major articles have appeared in local and state newspapers concerning the new oil field. A general feeling of optimism and anticipation exists for the expected economic benefits to the region. Private landowners are being offered substantial fees for the leasing of their land and people from all over the West are applying for leases for Federal land throughout the county.

Concern has been expressed by several state and Federal agencies and private groups for the protection of wildlife and the environment. However, the depressed economy of eastern Nevada, the increasing dependence of the United States on foreign oil, and memories of the recent oil and gasoline shortages have moved public opinion to favor energy resource development.

Some ranchers might be against leasing activities of exploration, etc., if it disturbs their livestock or if some are killed by such activities. Although the Indians are thought to be interested in pine nut harvest, few responses have been received by the Ely District concerning more potentially harmful actions such as chainings in pinyon-juniper type.

B. Participating Staff

Gary Lebsack	Egan Area Wild Horse Specialist
Wayne Logan	District Wildlife Biologist
Tom Dwonch	Recreation Specialist
Walt Cassidy	District Archaeologist
Edward Thompson	Forester/Fire Specialist
Norm Melvin	NSO Geologist
Bob Bales	NSO Environmental Coordinator

Persons who took part in the Duckwater MFP process from 1973 to December 1974.

C. Participating Agencies

Nevada State Clearinghouse
BLM Nevada State Office
Nevada Department of Human Resources - Air Quality Control
- Water Quality Control
- Solid Waste Management
Nevada Department of Fish and Game

CHAPTER V SUMMARY

As stated in the opening sentences of Chapter I, the purpose of this analysis is to consider oil and gas leasing as well as to upgrade the original Environmental Analysis in deficient areas. The original Hot Creek - Little Smoky Valley EAR was written by the Battle Mountain District.

A ground rule of the analysis was to look at the geographic area and analyze the proposed leasing program in light of the alternatives. The administrative action of leasing does not create many impacts; however, once an area is leased, exploration and development of resources is implied. (Exploration can also be undertaken, with no control, for oil and gas and has in the past. Exploration under a lease does provide some degree of protection.) The team made an effort to discuss possible impacts on various portions of the environment from the secondary functions which are allowed in a lease.

From Chapter III, we can draw the following conclusions. Major impacts could affect soil, water and human safety, and visual resources. Minor impacts could affect air quality locally, crucial habitat, water quality, etc. A major impact would be an oil spill which would have an effect on an immediate area for an undetermined time period.

Many of the possible impacts cannot be mitigated by the proposed action (Chapter IV) alone. However, Alternative I indicates that most of our areas of environmental concern can be protected to a practical extent (or better) with the addition of special stipulations to any leases.

Oil spills would remain an unmitigatable source of pollution. Through special stipulations, wells would be located some distance from flowing streams and springs. The visual impact can be modified, but cannot be fully mitigated if a production field is developed (because of powerlines, roads, etc.). Several other impacts can be modified but not fully mitigated if exploration leads to development; there are dust added to the air, potential harassment of wildlife, and some road kills, increased possibility of human danger due to working machinery, explosions, etc.

Positive impacts include new data about geology from drilling, possible new water developments for livestock and wildlife, upgraded roads, and economic return to the area directly on money spent for goods and services and indirectly by money returned to counties, etc., from the U.S. Treasury.

Another impact, if development occurred, would be on the social values, lifestyles, and community services of either of the existing cities - Carrant and Ely. Ely could absorb a few thousand people (which is more

than could be expected) with very little impact on social services and lifestyle. Housing would be critical for a while and trailers would, no doubt, be brought in. However, Currant could not stand such an impact. Ely would probably be a more logical staging area for location of families: four schools and a high school versus one two-room school, 300 plus beds in motels versus one seven-room motel, hospital versus no medical facilities, transportation heads versus none, etc.

Mitigation of the impacts on social services can only be made by assisting town councils and county commissioners to plan. As the chance of any of the area producing an oil field development is small, these impacts can only be identified at this time.

Overall, the majority of impacts that have been identified can be classed in the same area of probability as the social impacts just mentioned.

The study area has no population at all and is remote from any large population centers. This makes it an ideal area to visit for a feeling of isolation and wilderness area. This would be changed if developments do materialize.

REVIEWED

Initial Date

Environmental Coord.

CAJ

5/25/77

Area Manager

WSS

5/25/77

Chief Resource Management

ROC

5/26/77

District Manager

WSS

5/26/77

Technical Report
For
Little Smoky EAR*
For
Oil and Gas Leasing
In The
Ely District
Duckwater Planning Unit
White Pine and Nye Counties

(*Technical Reports for Geothermal Leasing can be found in the following documents: Final EIS for Geothermal Leasing; Final EAR for Leasing of Oil, Gas and Geothermal in Cherry Creek (N-8673); Regional Environment Analysis on Geothermal Leasing in the Eureka Resource Area (NV-060-5-55); and the Technical Report on Geothermal Energy Development (N-8672) by Robert T. Webb.)

Prepared by: Norman P. Stark, Geologist
Elko District Office

Date: April 20, 1973

Concurred by: Jerry K. Ostrom
Acting District Manager
Battle Mountain District

Date: April 23, 1973

Updated by: Eugene A. Jonart
Planning & Environmental Coord.
Ely District Office

Date: May 20, 1977

TECHNICAL REPORT

It is proposed to issue non-competitive oil and gas leases on national resource lands and forest lands in Little Smoky Valley. Leases will range between 640 and 2,560 acres in size. These leases will be non-competitive because the area is not within a known geological structure. Within a known geologic structure only competitive leasing would be authorized.

The proposal covers issuance of both regular and simultaneous offers to lease oil and gas. Regular offers are filed "over-the-counter" and issued on a "first come - first served" basis. Leases which have been extinguished for any reason are reoffered to the public at a simultaneous drawing. Those lease tracts for which no simultaneous offers have been filed at the time of drawing, again become available for regular offers.

Non-competitive leases are issued for a period of 10 years at a rental of 50 cents per acre per year. If oil is discovered, a graduated royalty beginning at $12\frac{1}{2}$ percent is collected on all production.

All leases, prior to commencement of drilling operations, are subject to a bond of \$10,000 per lease, a statewide bond of \$25,000 or a nationwide bond of \$150,000.

Revenue obtained from oil and gas leases is broken down in the following manner:

$52\frac{1}{2}$ percent to U.S. Bureau of Reclamation
 $37\frac{1}{2}$ percent to State of Nevada
10 percent to U.S. Treasury

At the present time, 3,409,000 acres are under lease in Nevada. These oil and gas leases will yield about two million dollars to the state per year.

In addition, in 1969, counties in the state received \$230,000 from taxes on leases held.

History of Oil and Gas Exploration in Nevada

Exploration for oil and gas in Nevada began in 1907 with the drilling of the Peavine Mountain Well near Reno. Prior to 1953, a total of 67 wells were drilled in Nevada, none of which encountered oil in commercial quantities. Most were shallow, few logs were run and much data for these tests are presently unavailable.

A modern, comprehensive petroleum conservation law passed in 1953, created the Nevada Oil and Gas Conservation Commission with authority to issue well drilling permits and to require logs of wells to be made and filed with the commission.

Between 1953 and 1967, under the new commission, 104 tests were drilled in Nevada for oil and gas.

In May 1954, Shell Oil Company drilled the discovery well in what is now the Eagle Springs Oil Field in the east-central part of Railroad Valley. Fourteen wells in this field have produced 2,606,587 barrels of oil through October 1972. No gas has been produced from these or any wells in Nevada.

Drilling has been confined mainly to west-central, northeast, east-central and southern Nevada. Exploration activity, which was intense during the 1920's and from the late 1940's through the early 1960's, is presently recurring in response to an energy crisis.

Energy demands in the United States have increased by a factor of seven (7) since 1900. To satisfy this demand, domestic production of natural gas has trebled, and petroleum doubled in the last 20 years. Nevertheless, there has been a growing reliance on imports, particularly petroleum. Currently, imports of crude oil and refined products amount to 35 percent of domestic demand as compared to 14 percent in 1950.

Projected deficiencies for 1980 under various assumptions range from 8,000,000 barrels per day (41 percent of demand) to 16,200,000 barrels per day (65 percent of demand).

Attempts to meet these requirements and alleviate the energy crisis have stimulated and will continue to stimulate exploration in Nevada as well as the rest of the United States.

General Geology

Little Smoky Valley is a north trending intermountain valley in which Tertiary sediments, if present, have been buried by Quaternary interlayered erosional debris, lake deposited sediments and volcanic sediments collectively known as "valley fill."

The Hot Creek and Kawich Range to the west and Reveille and Pancake Ranges to the east are composed principally of Paleozoic sediments and meta-volcanics overlain in part by Tertiary volcanic flows and intruded by Jurassic and Cretaceous igneous bodies with accompanying mineralization.

The most recent volcanic activity created the Lunar Crater Volcanic Field near the eastern edge of Hot Creek Valley.

No exploratory oil or gas wells have been drilled within the area discussed.

The complex structural history of the rocks and the failure of past drill tests to encounter oil in commercial quantities in similar geological settings indicate little potential for the area. However, exploration may delineate possible structures or traps which should be evaluated by drilling.

Historically, no physical work has been done on the majority of oil and gas leases in Nevada. In the event exploration is attempted, the chance of encountering oil and gas in commercial quantities is extremely remote. Nevertheless, any lease is a potential target for exploration which might result in discovery and exploration of a commercial deposit of oil.

STAGES OF IMPLEMENTATION AND RELATED ACTIONS

Exploration

The exploration stage includes all activities from the decision to explore until the "wildcat" well has been drilled. Exploration may be discontinued at any step if acquired data indicate that further activity will have little chance for discovery of oil or gas. During the exploration stage, the dominant activities are human and vehicular. Earth moving is confined principally to blading roads and preparation of drill sites. The "wildcat" well and stratigraphic test involve construction of access roads, drilling pads and sump pits. At the conclusion of an unsuccessful exploration effort, surface restoration is accomplished by capping or filling drill holes and reseeding disturbed areas. As exploration progresses from aerial geophysics to the "wildcat" well, surface impact varies from negligible to significant.

Exploration for oil and gas involves both geological and geophysical methods.

Geological Exploration

Geological field exploration includes surface and photogeologic mapping and the measurement of stratigraphic sections of exposed rock. Occasionally, where surface geology indicates a structure at depth, a stratigraphic test will be drilled to determine the position and subsurface characteristics of favorable strata. In the absence of surface structure, a stratigraphic test (strat-test) may be drilled to locate a key bed or to substantiate a structure delineated by geophysical methods. Most geological field work is done on foot utilizing one or more small field vehicles for transportation. Geological exploration, exclusive of the "strat-test," results in little or no impact on the surface.

Geophysical Exploration

Geophysical exploration includes gravity, magnetic and seismic methods of subsurface evaluation. (Gary 1972)

Gravity Method

The determination of the specific gravity differences of rock masses by mapping the force of gravity of an area using a gravimeter.

Magnetic Method

A technique of applied geophysics in which a survey is made of local spatial variations in total or vertical intensity. These measurements recorded on a magnetometer are interpreted as to depth, size, shape and magnetization of geologic features causing any anomalies disclosed.

Seismic Method

A type of geophysical investigation based on analysis of elastic waves artificially generated in the earth.

In Nevada, aerial, gravity and magnetic surveys are used in the preliminary evaluation of an area. Surface gravity and seismic methods are utilized for detailed structure determination and target delineation.

Airborne exploration is accomplished by flying a predetermined pattern or grid over an area and utilizing airborne instruments (gravimeter, magnetometer) to gather data. Data gathered by these instruments are compiled and interpreted. In evaluating favorable areas, additional and more detailed data are provided by surface gravity and seismic surveys.

Airborne exploration produces no surface disturbance and creates only a temporary negligible impact on air quality.

Ground gravity surveys are accomplished by a three man crew. Two survey a grid tied to known survey points or landmarks and the third member records gravity readings at predetermined points from a portable gravimeter. The only surface disturbance results from one or two small trucks used to transport the crew and equipment.

Seismic surveys provide information on subsurface structures by measuring the elapsed time required for induced elastic waves to travel from point of origin back to the surface after being reflected or refracted from strata at depth.

A seismic survey consists of the generation and measurement of elastic waves at predetermined points along a series or grid of straight parallel lines laid out on the surface of an area to be explored. These straight parallel lines are separated by an interval of one to two miles. At each point of wave generation (shot Point) a series of receivers (geophones) are laid out on the ground normal to the parallel along which the shot-points are positioned. The geophones pick up the surface return of the elastic waves and transmit the impulse by means of connecting cable to a recording truck where the time from generation to surface is computed and plotted.

Elastic waves are generated in the following three ways (Gary 1972).

<u>Vibration Method</u>	Vibrations in the earth are produced by a number of truck mounted vibrators, usually four, which vibrate in unison at a frequency controlled by radio from another truck.
<u>Thumping Method</u>	A truck drawn or self-propelled unit containing a heavy weight or "hammer" which is dropped to the ground produces elastic wave propagation in this method.
<u>Explosive Method</u>	In this method a truck-mounted rotary drill is used to drill holes 100 - 200 feet in depth which are loaded with 5 - 50 pounds of explosives and detonated (shot) to produce elastic waves.

In all three seismic methods 5 - 7 truck and 10 - 15 men are required. Surface mineral matter and vegetation must be removed from the energy generation sites (shot points) and receiving sites (geophones) to provide for the maximum amount of energy to be sent and received. In addition, the explosive method often requires road construction, blading of lines and clearing of small areas for drill operation.

All three seismic methods involve varying degrees of surface disturbance. The explosive method produces the most intense surface disturbance. Only the explosive method possesses the potential for subsurface impact (damage to nearby water wells, damage to near surface aquifers, etc.), and then only within a limited radius of the shot point.

Drilling

Drilling as defined here includes all drilling operations undertaken during exploration development and production and related phenomena encountered in the production of seismic shot-holes, stratigraphic test holes, "wildcat" wells and production wells.

Drilling rigs used in these operations vary in size from the small truck mounted variety used to drill seismic shot-holes and shallow "strat-tests" to huge oil field rigs weighing many tons and requiring 15 - 20 trucks to haul the dismantled rig and associated equipment. Depending upon the size of the rig used, the drilling pad which must be prepared, varies in size from a space large enough to accommodate the truck upon which the drill is mounted to an area of 2½ acres for the large "wildcat" and production rigs.

This type of drilling is known as rotary drilling because it employs the principle of a rotating vertical pipe (drill stem) upon which has been mounted a rock bit designed to chip rock as it rotates under pressure. Drill cuttings or chips produced as the hole progresses are removed from shallow shot-holes by introducing a jet of air during drilling. For deeper drilling, a circulating medium of water or "mud" (a suspension in oil or water of various finely divided substances each possessing specific properties)

is pumped down the inside of the drill pipe and allowed to return up the annular space between the hole wall and the outside of the drill pipe. This circulating medium is used to cool and lubricate the bit as well as to return the drill cuttings to the surface. Drilling "mud" helps prevent caving by plastering and consolidating the walls of the hole with a clay lining thereby making casing unnecessary during drilling. At depth, formations are often penetrated which contain fluid, gas or both under extreme pressure. When these situations are encountered, the specific gravity of the drilling mud can be adjusted by adding heavy components in an attempt to equalize the bottom hole pressure and prevent a blowout.

Large oil drilling rigs are provided with mechanical valves known as blowout preventors which can be closed manually or automatically to prevent blowout or escape of fluids when extreme bottom hole pressures are encountered and mud weight cannot be adjusted quickly enough. However, due to malfunction or other unforeseen events, blowouts and escape of fluid do occur. Blowouts unload the drill pipe from the hole and scatter drilling mud over the surface adjacent to the hole. Blowouts are often accompanied by well fires if gas is ignited. Well fires usually result in the destruction of the drilling rig, rupture of fuel and storage tanks and general pollution of the surface and air in the vicinity of the well.

Drilling with a circulating fluid requires quantities of water, varying from a few hundred gallons to as much as 50,000 gallons per day per well during the "wildcat" and production stages. Smaller amounts are required to drill a stratigraphic test and can be provided by trucks hauling from a source which may be some distance from the test hole. Water requirements for development and production stage wells are, if possible, supplied by water wells drilled in the field. Unless water is obtained from aquifers at sufficient depth, adverse effects may be experienced by operations dependent upon surface water and near surface aquifers.

Development

This stage of implementation is the period of most intense activity. The producing limits of the field are outlined by developmental drilling and production wells are spaced in a manner to most efficiently exploit the field. During this period many mud pits and other earth filled impoundments are required for mud handling in drilling and for entrapment of fluids including oil which may escape during drilling and testing. Human and vehicular activity are high during this time. As the field develops, these structures are gradually replaced by tanks and structures of a more permanent and reliable nature. The developmental stage is the interval of construction of pump stations, flowlines, pipelines and electrical transmission lines. Because of the number of wells being drilled during this stage of implementation, accidental spills, leaks, blowouts and fires will occur more frequently and have the greatest impact on the surface.

It has been estimated from measurements taken of roads, pipelines and well sites that up to 25 percent of the ground surface may be disturbed within a fully developed oil field with wells spaced on a 40 acre pattern. This surface disturbance is not of a permanent nature because during the developmental stage, much of the involved surface is rehabilitated. When the field is abandoned, the involved surface is totally rehabilitated.

In order to appreciate the magnitude of surface impact created by a fully developed field in the Little Smoky Valley, the following example may be considered:

If oil were discovered, and if a field were developed within the boundaries of the Little Smoky Valley area, the field would most likely be similar in size to the Eagle Springs Oil Field which encompasses roughly 1,280 acres. The area (25 percent) of surface disturbed with development of an oil field would equal approximately 360 acres. A total of 1.2 million acres are contained within the boundaries of the area. Therefore, the area disturbed in development of a field comparable in size to the Eagle Springs Oil Field would represent 0.03 percent of the total surface.

Production

The production stage is principally the operation and maintenance interval. Oil which flows or is pumped from wells is collected and transported by pipeline or truck to a refinery. Old wells are often deepened in an attempt to intercept new pay zones. Secondary recovery methods utilizing injection of water or gas into peripheral wells to obtain oil otherwise not recoverable are initiated during this stage. Collection facilities, pipelines and transmission lines have been constructed by this time. Methods of solid and liquid waste disposal have been standardized. The impact on surface and air from construction, spills, accidents and human activity are proportionately less than during the developmental stage.

Abandonment

Equipment removal, cementation and capping of drill holes and wells, rehabilitation and revegetation of the surface are accomplished during this stage of implementation. During this interval, adverse surface impacts will be at a minimum. Rehabilitation and revegetation will produce some beneficial surface impact.

Rights and Obligations of Lessee

The standard lease (Form 3120-3) grants certain rights to and imposes certain obligations upon the lessee.

Section 2 of the standard lease grants to the lessee "the exclusive right and privilege to drill for, mine, extract, remove and dispose of all the oil and gas deposits except helium gas, in the lands leased, together with the right to construct and maintain thereupon, all works, buildings,

plants, waterways, roads, telegraph and telephone lines, pipelines, reservoirs, tanks, pumping stations, or other structures necessary to the full enjoyment thereof, for a period of 10 years, and so long thereafter as oil or gas is produced in paying quantities."

Section 2(q) of the standard lease imposes upon the lessee a number of standard stipulations designed to protect the surface, natural resources and improvements.

The stipulations require the lessee "to take such reasonable steps as may be needed to prevent operations from unnecessarily:

- (1) Causing or contributing to soil erosion or damaging and forage and timber growth thereon,
- (2) Polluting the waters of reservoirs, springs, streams, or wells,
- (3) Damaging crops, including forage, timber, or improvements of a surface owner, or
- (4) Damaging range improvements whether owned by the United States or by its grazing permittees or lessees; and upon conclusion of operations, so far as can reasonably be done to restore the surface to its former condition.

The lessor may prescribe the steps to be taken and restoration to be made with respect to the lands of the United States and improvements thereon."

In addition to the standard stipulations set forth in Section 2(q) of the lease (Form 3120-3), a copy of the following Oil and Gas - Surface Disturbance Stipulations, more commonly referred to as the "Open-End Stipulation" is attached to the lease:

1. Notwithstanding any provision of this lease to the contrary, any drilling, construction or other operation on the leased lands that will disturb the surface thereof or otherwise affect the environment (hereinafter called "surface disturbing operation") conducted by lessee shall be subject, as set forth in this stipulation, to the prior approval of such operation by the Area Oil and Gas Supervisor in consultation with the appropriate surface management agency and to such reasonable conditions, not inconsistent with the purposes for which this lease is issued, as the Supervisor may require to protect the surface of the leased lands and the environment.
2. Prior to entry upon the land or the disturbances of the surface thereof for drilling or other purposes, the lessee shall submit for approval two copies of a map and explanation of the nature of the anticipated activity and surface disturbance

Leasing Considerations

In developing the environmental analysis record prior to leasing, surface environmental impacts resulting from the proposed action and alternatives are analyzed and special stipulations formulated to mitigate these impacts.

When issued, a lease grants certain rights to the lessee. Special stipulations which deny or infringe the rights granted by a lease should be included at the time the lease is issued. If conditions exist such that an environmental impact can be mitigated only by formulation of stipulations in conflict with a lease granted right, the lessee should be aware of such conflicts in order that he may elect not to lease if the conflicting stipulations create an untenable situation for him.

An example of such a stipulation is one in which the lessee is denied the right to surface occupation of the leased land except by decision of the BLM District Manager concerned. Another stipulation might be formulated to exclude surface occupation of certain areas in a lease and to allow only directional (angle) drilling to explore beneath these areas.

Such stipulations limit the lease granted rights of a lessee and might influence his decision whether or not to lease.

Conclusions and Recommendations

It is concluded that the proposal to issue oil and gas leases in the Little Smoky Valley area subject to the general lease and "open-end" stipulations and special recommendations designed to protect specific values within the area is reasonable and the special recommendations not unduly restrictive.

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